Eureka SuperKidz: External Evaluation Findings 2010-11

Eureka SuperKidz is an education initiative implemented by AID INDIA in collaboration with Pratham. With support from the Stones Foundation, India Literacy Project, Asha Chicago and a few corporates like PwC and Wheels India, the program was launched in 200 villages in July 2010. Then with support from a group of patrons and a large number of individuals who adopted the program in specific villages, the Eureka SuperKidz program was scaled up to 500 villages in January 2011. This academic year, we hope to raise additional funds to scale up the program to reach children in 1000 villages.

This report presents the external evaluation findings from the first year of implementation of the project. The report has the following structure:

Introduction to the Eureka SuperKidz program

Eureka SuperKidz is a multi-year intensive effort to improve learning levels of children in the poorest and most marginalized villages in Tamilnadu. In each village, 3 local tutors are hired and trained to provide 3-hours of after-school evening support classes for children. Each child's skill level is tracked using the Eureka Skill Chart and children who lag behind are given special attention. Specially designed games and activities help children focus and learn better.

Parents are involved from the start and pay a small fee to support part of the costs for the program. This fee payment makes the village tutors accountable to parents who regularly monitor the evening classes. Community events and festivals where children present what they have learnt also create a wider learning environment in the village. Where possible, the Eureka SuperKidz program also provides training and volunteer support to help school teachers focus better on lagging children for 1-2 hours during school time. In several villages, the Eureka SuperKidz program also works with ICDS Balwadi centers run by the Govt to provide pre-primary education inputs to children.

Along with impacting learning outcomes of children, the program has also been able to build a lot of confidence in children and parents. In every village, parents have expressed great happiness after seeing the improvements their children have been making. In several villages, school teachers and panchayat leaders, seeing the impact being made, have provided additional resources like notebooks, pencils, lights, etc for the program. A large number of visitors to the program have expressed happiness at how the classes are being run and the exciting learning atmosphere in the centers. A collection of case-studies of individual children and description by visitors is available at: www.eurekachild.org.

Though there are a lot of important benefits from the program in terms of confidence building, creating a learning environment, building parent involvement in education, teacher training, etc, this external evaluation report focuses exclusively on children's learning outcomes.

Introduction to the External Evaluation Process

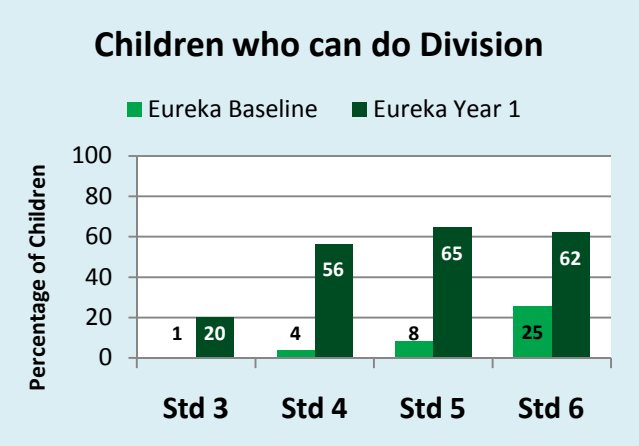
To measure the impact of the program, an external evaluation agency (NCIS) was commissioned to conduct an initial baseline in July 2010 and an end-of-the-year[1] evaluation (Year 1 Evaluation) in April 2011. To ensure statistically significant measurements, the external evaluators did a random selection of 30 villages from the set of villages where the Eureka program had been started. They also selected a random set of 20 control villages (where Eureka program is not running), which were from similar socio-economic background as the Eureka villages to compare[2] and understand the value-added by the Eureka program. Five teams of evaluators conducted the evaluation over 3 weeks. To ensure the data reflects actual changes in learning outcomes and not just a change in the set of children, the evaluators assessed the same cohort of children at the baseline and end-of-the-year in both, the Eureka villages and the Control villages. The evaluation covered 3268 children from pre-school age group till Std 6. Each child was tested individually on different skills in Math, Tamil and English (and the pre-school children were tested on Number concepts, Cognitive and Language skills). Cross-checking and validation mechanisms were put in place to ensure data accuracy.

[1] Some argue that a year is too short to measure learning improvements accurately and such changes must be measured only over several years. We recognize that sustainable improvement in learning quality takes several years of work and improvements seen over a year can vanish without consistent effort over several years to stabilize it. But programs also need periodic outcome feedback to make course corrections to be successful. So we believe it is essential to assess learning outcomes at least every year – and to use it to continuously improve program design and delivery.

[2] The purpose of the Control evaluation is NOT to make judgments on other programs or blame teachers or schools. Rather, the main purpose is to understand better what is working and what is not in the Eureka program, and to use this evidence to further improve what is being done, so that all children learn better. So this evaluation serves two purposes: One - to gather evidence for our impact (our value-add), and, Two – to understand areas where we need to change or focus better.

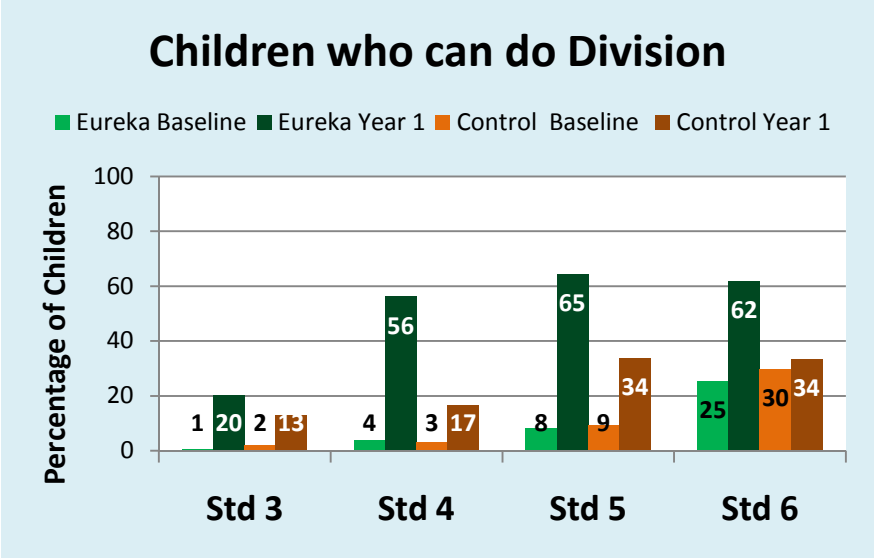
Math Evaluation Findings

The adjoining chart shows that the percentage of children in the Eureka Villages who can do division in various standards has improved by a huge factor. For example, in Std 5, 8% of the children in July 2010 knew to do division and in April 2011, 65% children knew to do division: a 57% increase.



While this is important information and shows the progress made by children over a year, in any school year, children do make progress. So in all schools, we should expect children to be doing better at the end of the academic year than at the beginning of the year. Comparing pre and post results over a year only tells us how children progressed over a year and does not tell us the actual contribution of the Eureka program. We can see this by comparing a set of other children (in Control Villages) from similar backgrounds who attend similar schools and seeing how much improvement they make over the same year.

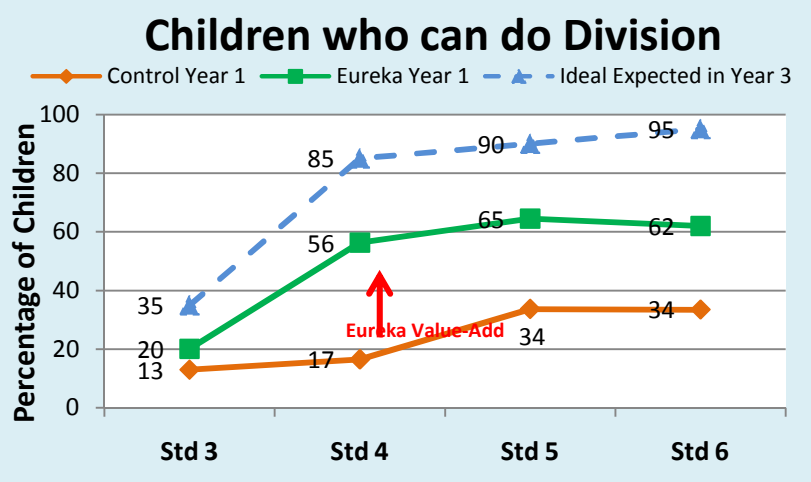
This adjoining bar chart[3] shows the progress made by children in the Eureka program and also shows the progress made by children in the Control Villages. Now let's again look at what this chart says about Std 5 children. In Eureka villages, initially 8% of children could do division and by the end of the year 65% could do it. In Control Villages, initially 9% children could do division and this has improved to 34% children being able to do division by the end of the year. This means the improvement in Control villages was 25% and in Eureka villages it was 57% (32% more than Control Villages). If we assume that the increase in Control villages represents how much children normally learn in a school year (Natural Learning Increase over an academic year), we can conclude that the **Eureka program has helped an ADDITIONAL 32% CHILDREN LEARN DIVISION IN STD 5.**



The control therefore helps us quantify the actual contribution of the Eureka program and we can say that of the total 57% improvement, 32% can be directly ascribed to the Eureka intervention. Similarly,

[3] In this and all other charts used below, the green bars represent Eureka program villages and the Brown bars represent the Control Villages. The lighter shade is the baseline and the darker shade shows the year 1 results.

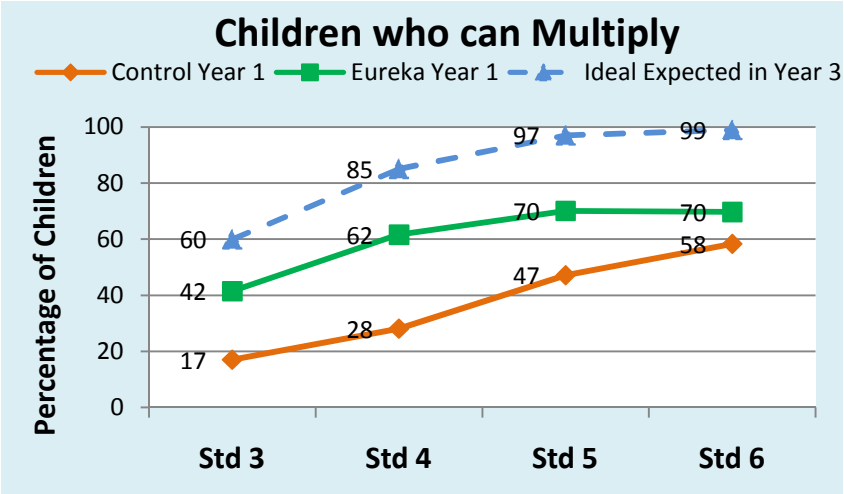
the chart also shows that 33% (=37% - 4%) additional improvement in Std 6 and 38% (=52% - 14%) additional improvement in Std 4 and 8% (=19% - 11%) additional improvement in Std 3 can be ascribed to the Eureka intervention. As the Eureka Baseline and the Control Baselines are similar, both sets of children start off at the same learning level. But their Year 1 performance is very different: Eureka children have learnt a lot more division during the year.



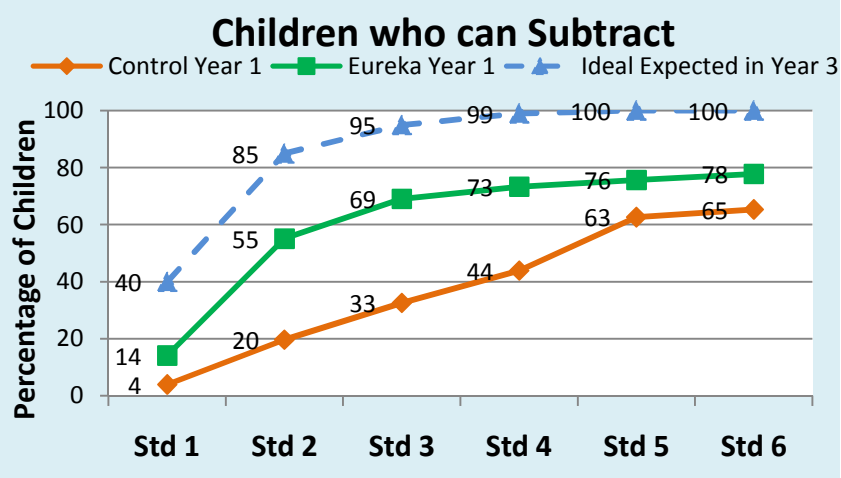
The adjacent line chart shows this more clearly. The graph also gives additional insights. The brown line represents how children progress in different standards in the control villages. **We call this the Natural Progress line.** The green line represents how children in different standards perform in Eureka villages. **How much above the Natural progress line the green line is lifted is a good measure of Eureka Value-Add to learning improvement.** **From this chart, we see that 30-40% *additional* children in Std 4-6 in Eureka villages have learnt division compared to control villages.** This is a huge improvement. The graph also points out that the improvement in Std 3 children is only 7% over control - not as much as in the other classes, but as division is just introduced in Std 3 and most children haven't even learnt subtraction and multiplication, this lower improvement is expected. The more serious issue is the flattening of the curves (both Eureka and Control) in Std 6. We do expect flattening of the curves at higher classes. But the flattening must happen at 85-95% not at 35% or even 65%. This means children who are behind are not catching up even with more time. This requires serious attention.

The blue line shows our expectation of what the percentages in each standard should be. This is arrived at by looking at the state syllabus expectation and keeping in mind the achievement levels of similar age children from well-to-do educated families. We realize that the blue line sets a high benchmark and will take time to achieve. But it is good to know what the benchmark is and how far we need to go to get there.

This next chart on the right shows the Eureka improvements over control in multiplication. **In Std 3-5 in Eureka Villages, we can see a big jump of 25-35% over Natural Progress.** Though Eureka villages have performed better than control in all standards, the relatively lower increase in Std 6 in multiplication and Std 5 and Std 6 in Subtraction needs to be looked into.

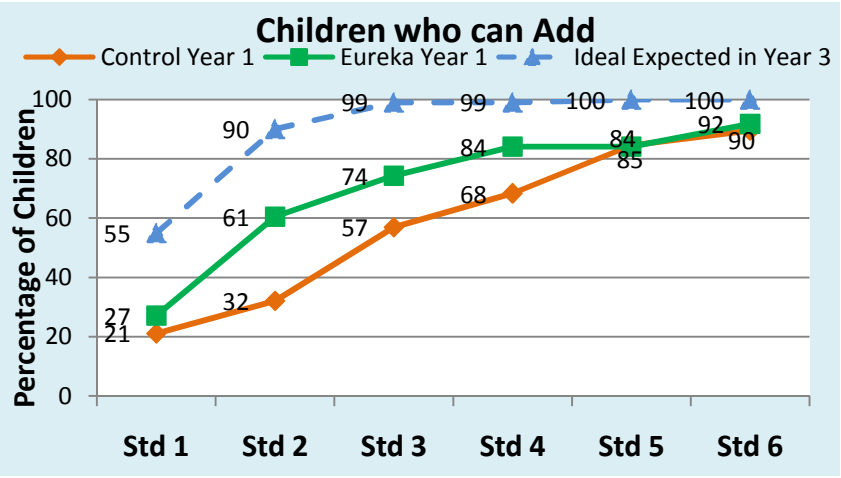


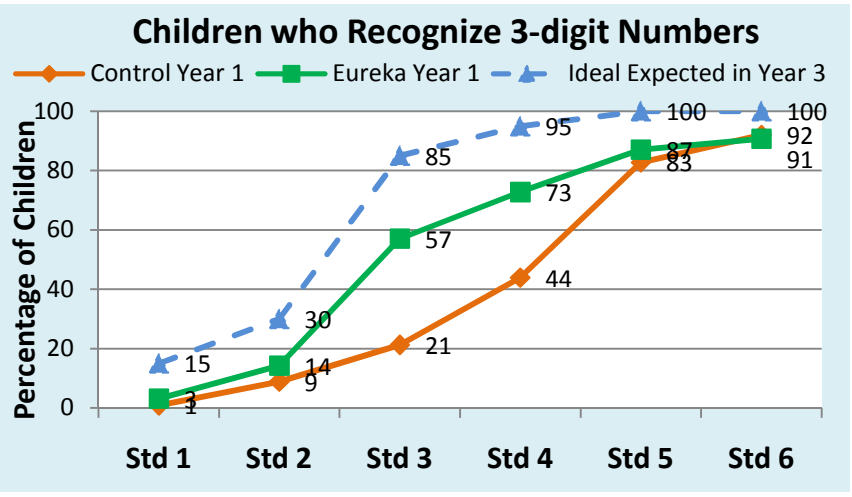
The adjoining chart shows that subtraction in Std 1 has improved only by 10%. Part of the reason for the smaller improvement is the fact that most children enter Std 1 without knowing counting or single digit numbers. We hope that with better pre-primary inputs at the pre-school level, children in the future years will enter with better number skills and a significant percentage will graduate to doing subtraction by the end of Std 1.



The next two graphs on the right look at Addition and Number recognition skills. We can again see that there is a good jump in the Eureka villages in Std 2, Std 3 and Std 4 in Addition and Std 3 and Std 4 in Number recognition.

There is the expected flattening of the curve at the higher classes. But it is flattening 10% lower than where we would like. This means there are 10% children who are just not learning these basic skills even after 3-4 years of delay. Our remedial programs which are helping 35-40% of the children learn faster are probably not helping these 10% children. They probably need different learning activities or more individual time or possibly both. The charts also show the lower relative improvement in Std 1 in Addition and Std 1-2 in 3-digit numbers. This is possibly because the TN school system does not introduce these skills until later (unlike many elite schools who expect and achieve this earlier.)





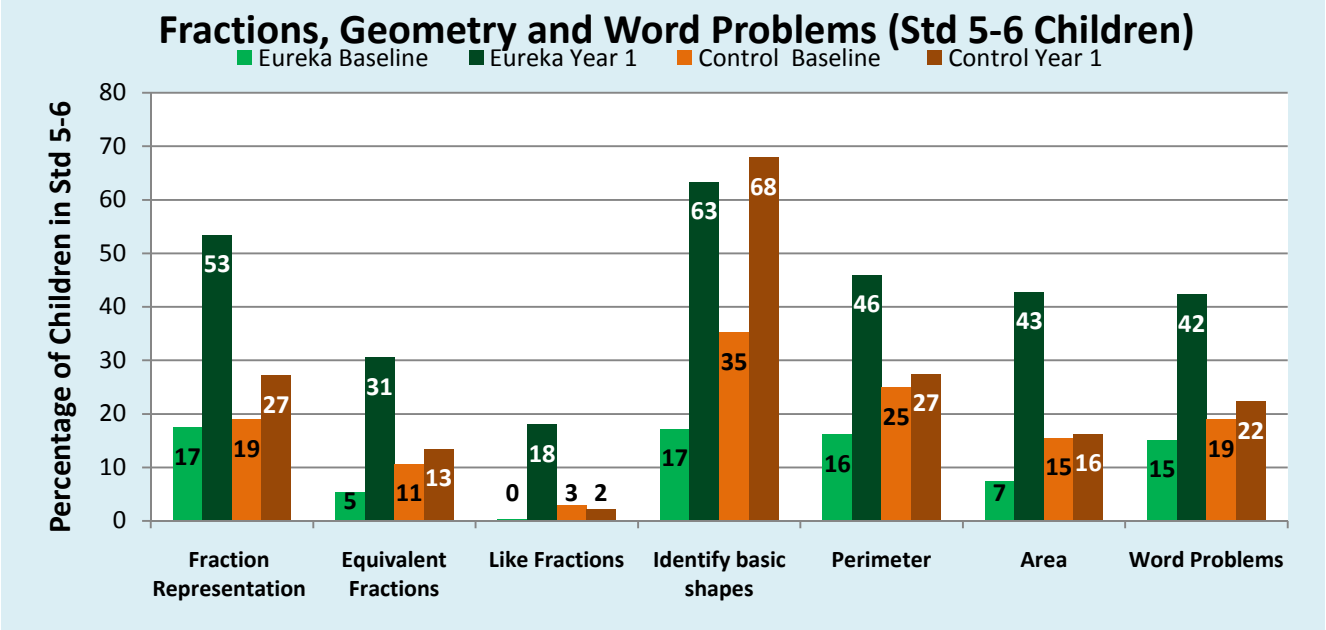
We can calculate the learning acceleration in Eureka Villages by seeing at what standard in Control Villages a similar percentage of learning is achieved. Using this approach, we can see from the earlier charts that **in Eureka Villages, multiplication and subtraction levels have accelerated by an equivalent of 2 standards and Addition and Number Recognition have accelerated by more than 1 standard.**

Accelerating Learning

In general, looking at the control lines (Natural Progress) across all the above charts, we can see that on every skill, children are learning later than they should. The skill is introduced in a particular class, but children learn it over several classes. For example, most children should have learnt addition in Std 2, but only 32% have learnt it. Some learn it in Std 3, a few more learn it by Std 4 and yet others learn it in Std 5 and 10% don't even learn it by Std 6! Learning delayed means learning deprived. Many children who learn their basics later miss out on a lot of what is taught in class and never manage to acquire higher level skills. Ensuring children learn earlier (at the appropriate age) therefore also ensures children learn more. **That's why accelerating learning is important!**

A dangerous growing fad in the country says it is ok for children to learn later. This is a gross misunderstanding of what 'learning-at-your-own-pace' really means. Some children start walking in 8 months and others do it in 16 months and its good advice to tell parents to not get worried if their kids walk a bit later than other kids. But if a child is still not walking at 3 years, not getting medical advice is foolish. Similarly, 'children-learn-at-their-own-pace' holds only within a limited range. What this means is that, not all children will learn addition at the same time (*or in the same way*) – and so we should allow children to learn it over a ***few months.*** But this does **not make it *ok*** for some kids to learn addition ***3-4 years*** after it is introduced! When a child is consistently lagging behind on a skill, the teacher must be worried and must spend extra time helping the child learn it (possibly using different methods). This is not being done today in large number of schools. And it is a costly mistake when instead of addressing this systemic failure head-on, the system tries to cover it up by renaming the bug as a new feature!

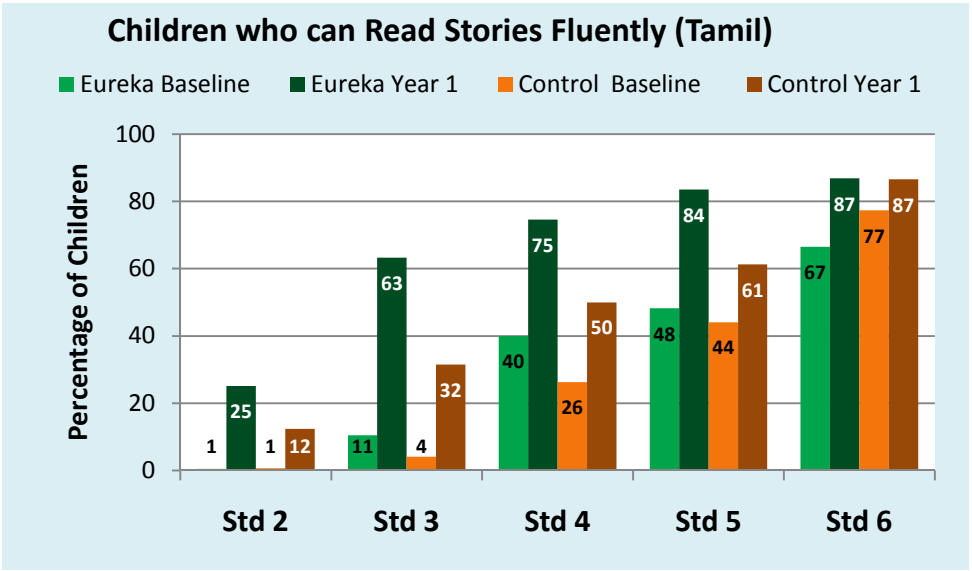
All the above charts showed children's performance in basic arithmetic skills. The Eureka program also focused on higher level skills for Std 5-6 children and the chart below looks at some of these skills.

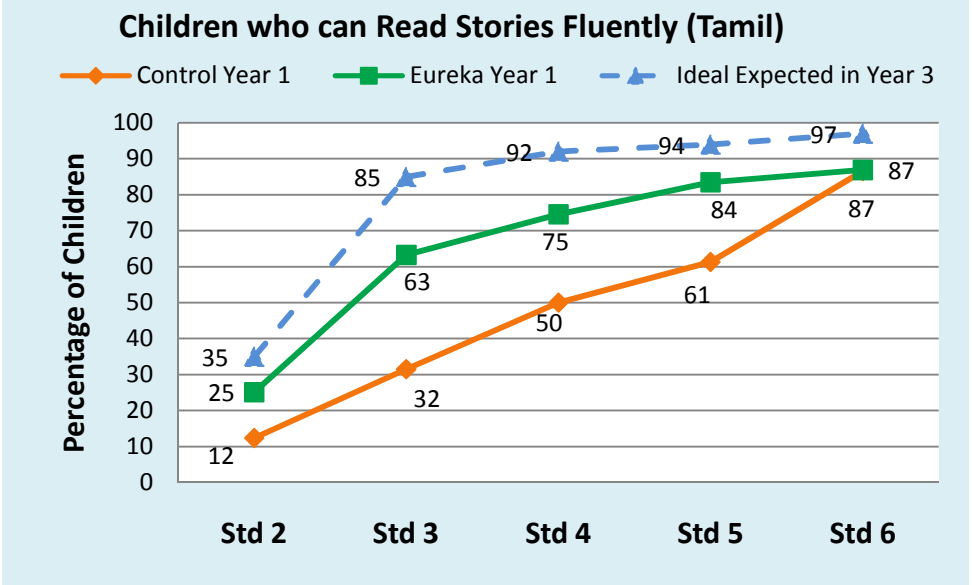


As the chart shows, there has been a significant improvement in the Eureka Villages (both in absolute terms as well as relative to control) in almost all the above skills. In particular Fraction, Measurement and Word Problems have shown a big difference over control. But Eureka and Control perform at the same level in basic shape recognition and it is important to focus on this more and improve it earlier, so that more children can achieve higher geometry skills later.

Tamil Evaluation Findings

As the next two charts show, children in Eureka villages who can read a story fluently increased by 25-50% across all standards when compared with the baseline. Even after accounting for the natural increase shown in the control villages, the Eureka villages still show a large improvement. **In Std 2, Std 4 and Std 6 there is a 10-13% improvement in Eureka villages over control and in Std 3 and Std 5 there is 19-24% improvement over control.**



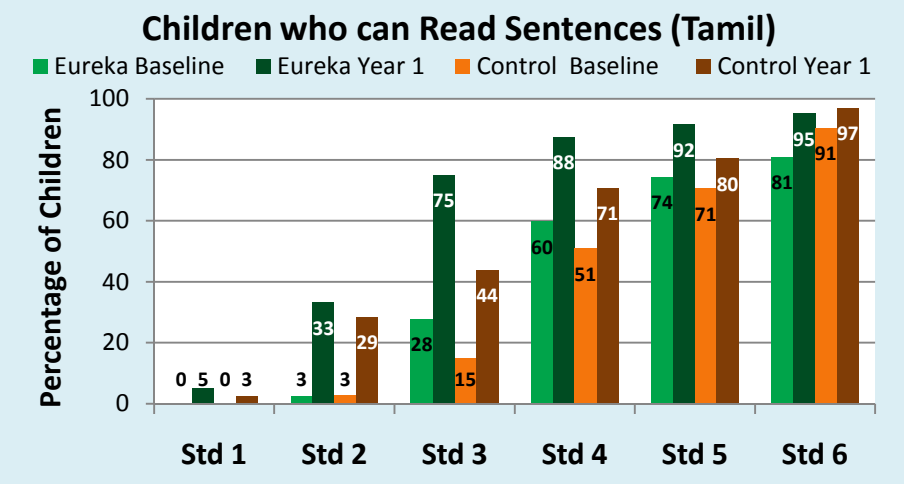


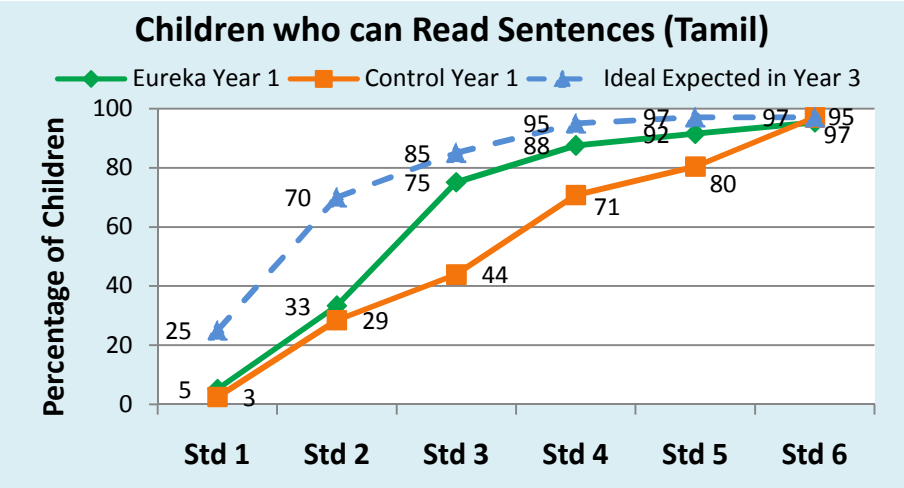
The line chart also shows the clear upward shift in the learning curve in the Eureka villages. For example, Std 3 Eureka children perform at the same level as Std 5 Control children. This means the Eureka children have had a learning acceleration that's equivalent to 2 years of learning in control villages.

The learning curve levels off at around 85% by Std 5-6. This means 15% children are still not able to read fluently even with the additional inputs we have provided. Further research is needed to find out who these children[4] are and why they are not improving.

[4] The data shows that there were 7% children who started Std 5 without being able to read words and progressed to sentences and hopefully will progress to reading stories in the coming year. But there also seem to be another 8% children who were already reading Sentences but have not progressed beyond. As these 15% children are already in Std 5-6, their slow pace of improvement is worrying. Maybe some of these children (5-8%) are dyslexic or have other learning disabilities that need specialized inputs, something we are not yet geared to providing. But not all 15% can be ascribed to such problems. We need to research if a separate focused input using different methods might be able to address the problem for these children.

The adjoining two charts show the Tamil Sentence reading skills of children. Again we can see a big learning jump in Eureka villages compared to control in all standards. And as the line chart highlights clearly, the gain has been very large in Std 3, Std 4 and Std 5. By Std 6, both in Eureka and Control villages, almost all children are able to read sentences. But the relative lower improvement in Std 1-2 means that we need to focus more on Sentence reading in these classes (particularly Std 2 as the gap between expected and achieved is high).





Another point to note from the last two bar graphs is the significantly higher baseline percentages in Std 3, Std 4 and in Std 5 in Eureka villages compared to the Control villages. For example, in Sentence reading Std 3 in Eureka villages starts at 28% whereas control starts at 15%. In Story reading, Std 4 in Eureka villages starts at 40% whereas control starts at 26%. This is very different from the baselines in Math where both Eureka and Control villages show the similar levels.

We believe that this baseline increase in Tamil Reading in Eureka villages is the impact of our earlier large scale Reading campaign (this campaign, 'Padippum Inikkum', was implemented in nearly 10,000 Govt primary schools across 10 districts from Jan 2007 to Oct 2009). As the current Std 1 children had not yet entered school and the current Std 2 children would have had less than 3 months of intervention, we don't expect to see much impact on them and the baseline data does show that the Control and Eureka villages start off at the same level in Std 1-2. The current Std 3-5 children would have benefitted the most from the program (as they were part of the program for the entire period) and this shows up clearly in the higher baselines in Eureka villages. Std 6 is more of a puzzle: Both in Math and in Tamil Reading, the baselines in Eureka are lower than in Control. Primary schools end at Std 5 and so most children move schools in Std 6. Therefore a lot of shuffling between Govt and Private schools happens at Std 6. So maybe the baseline performance difference has something to do with this. We are still not clear why this is so. Unfortunately there seems to be no existing research done on school-shifting – why it happens, what it does to learning levels, etc. We therefore now plan to research this and a few other aspects that impact learning levels.

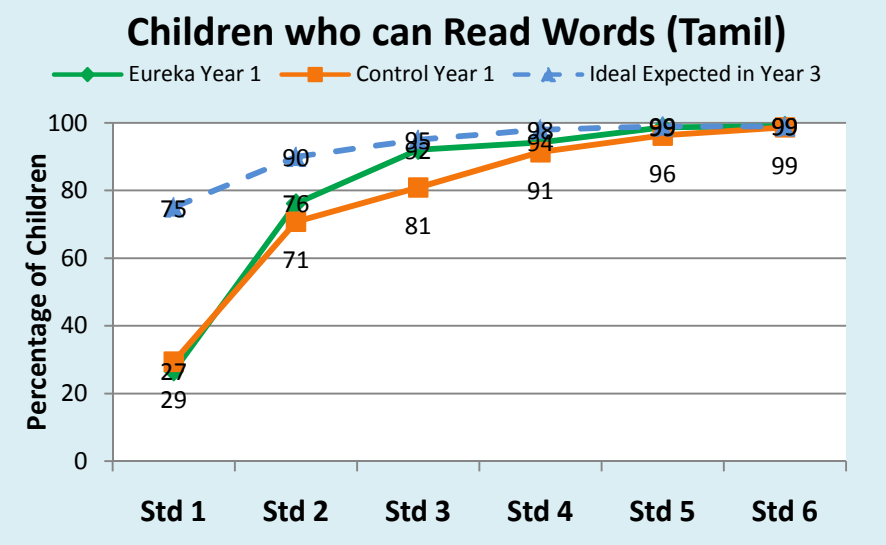
Urgent Need for Quantitative Data Driven Approach in Education

In a country as large as India, with 200 million children in schools, the effort we put into education research is abysmal. Government collects a huge amount of data on enrollment, attendance, teacher appointments, etc. But when it comes to what children are learning – the main purpose of schooling – there is just no data available! Unreliable pass-percentages are assumed to be sufficient indicators of learning. No data is collected on what children actually know in each subject or skill they are supposed to be learning. No learning data = No analysis = No understanding of what works and what does not = No evidence based course-correction or improvement. So Govt officers introduce and withdraw programs based on what they 'feel' without data or evidence to show what works. They also run programs and claim success without actually measuring impact on children's learning. A sad reflection of how this gap is often neglected, and can sometimes even be touted as a virtue, is a remark made a few years ago by a senior officer who claimed, "I have personally visited a large number of schools. I know what works. I don't believe in data or evaluation." If a head-teacher of a small school who sees her children every day says this, it might be acceptable. But how is it possible for a senior officer responsible for over 40000 schools to work effectively without looking at data or evaluation?

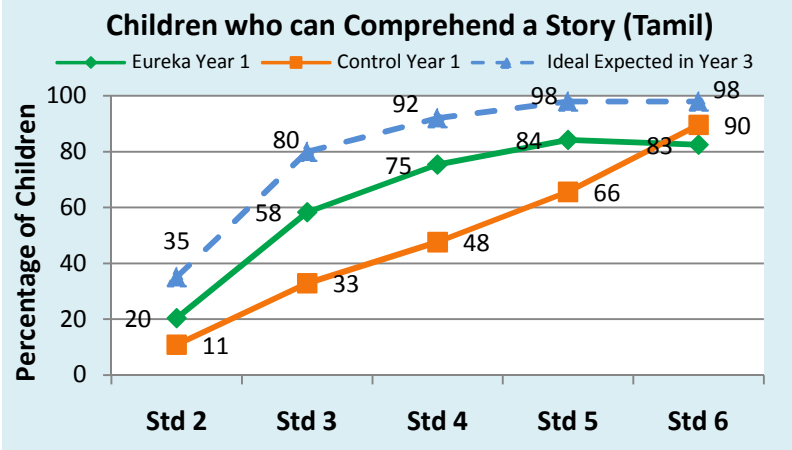
Most Educationists and Education Researchers in India seem to shy away from statistically significant quantitative assessment and focus on limited qualitative assessments. Qualitative studies do have a lot of value – but there is also a serious need for quantitative evidence based research. When Pratham, a voluntary movement, came out with the annual learning assessment, ASER, in 2005 testing basic reading and arithmetic skills, there was nothing else available with which its findings could be compared ! Recently, a few organizations like Education Initiatives and NCERT have started looking at quantitative learning data. But for a large country this is hardly enough.

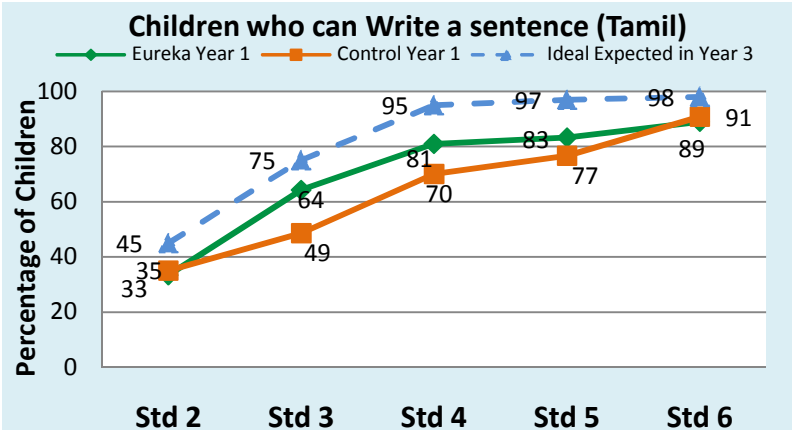
Neither NCERT and SCERTs (State Council for Education Research and Training), nor the SSA seem to conduct or commission serious studies that look at how children are learning various subjects and what they actually find difficult and how it can be improved. Education Departments in Universities abroad do a lot of research into how children learn. There is surprising absence of such research from Indian Universities and Teacher Education Institutes. There is just no research or data available on how much children in different schools learn in algebra in Std 7 or how much arithmetic they actually learn by Std 4 or how many students in Std 3 can read a sentence. So when a field implementation organization like ours works on programs, we have to therefore start from scratch, build research capabilities and collect data and evidence for even fundamental learning issues like Natural Progress, Summer Loss, Role of school-shifting, etc.

There has been a good jump in Eureka villages in Std 3 Word-Reading but not much improvement in Std 1-2. The higher standards as expected are able to read words. But this is a basic skill which a large percentage of children must achieve by Std 1. The gap between what is expected and what is achieved (in both Eureka and Control) is very large in Std 1-2. We have seen a similar pattern in Tamil Letter reading as well.



The graphs show that in higher order skills like Story Comprehension and Sentence Writing, Eureka Villages perform much better than Control. **There is a learning acceleration in Eureka Villages of almost 1-1.5 years compared to Control villages in Std 3-5.** There is the stagnation and lower performance in Std 6 (as seen also on other skills), which needs further research. In Sentence Writing in Std 2, Eureka villages and Control villages are performing at the same level, though the gap between expected and achieved is not very large. Though we might expect fewer children to write than to read, surprisingly, in Std 2 and Std 3, 5% more children can write than can read a sentence! The difference might be due to more difficult sentences given for reading and easier ones for writing. But overall, it does seem like Sentence Writing is a skill children are learning well in school. Probably, schools focus on writing a lot more than they focus on reading.





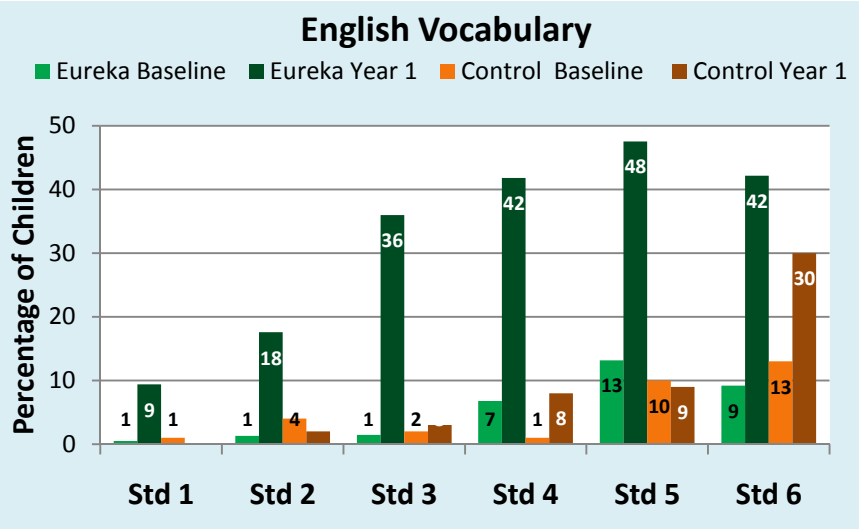
Some Lessons from the Evaluation Findings

The evidence from the data is quite clear. In higher standards and in all higher level skills in Tamil and Math, Eureka villages are performing much better than control villages. But in Std 1-2, in lower level skills like reading letters and words and in 2-digit number recognition, Eureka villages are performing at the same level as Control villages. This could mean one or more of several things:

1. The targets set are too high and cannot be achieved by these younger children until later.
2. Unlike for Std 3-5, the current Govt methodology (ABL) works reasonably well for Std 1-2 for these lower skills and so the value-added by the Eureka program is not much for these children and these skills.
3. Eureka methods work less effectively for lower standards. So we need to find alternate methods that work better for these standards (for these lower level skills).
4. Eureka methods work well. But implementation is weaker because combining Std 1, Std 2 and Std 3 children under one Eureka Teacher reduces focus on Std 1-2 children.
5. Children enter school unprepared as they have no pre-primary inputs. A good pre-primary program can ensure they are ready to absorb better in Std 1-2.

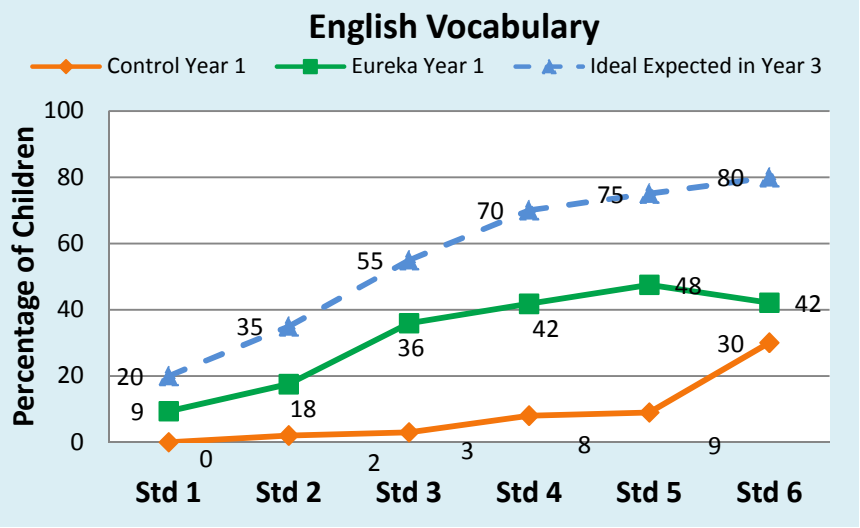
We don't believe 1 is correct. Children from educated well-to-do families achieve a lot more by this age. Our observation over the years has shown that the Govt's ABL program works reasonably in Std 1-2 but becomes quite ineffective in Std 3-5. This might explain the much larger Eureka value-add in Std 3-5 and a lower value-add in Std 1-2. But this does not mean Std 1-2 children need no extra support! The large absolute gap between expected and achieved clearly means a lot more needs to be done for these kids. We have seen that good pre-primary inputs definitely do create a big difference. So we need to strengthen our pre-primary program. We also have to study factors 3 and 4. We need to research newer and better approaches and activities and also look at whether our class-organization needs to be changed for better focus on Std 1-2.

English Evaluation Findings



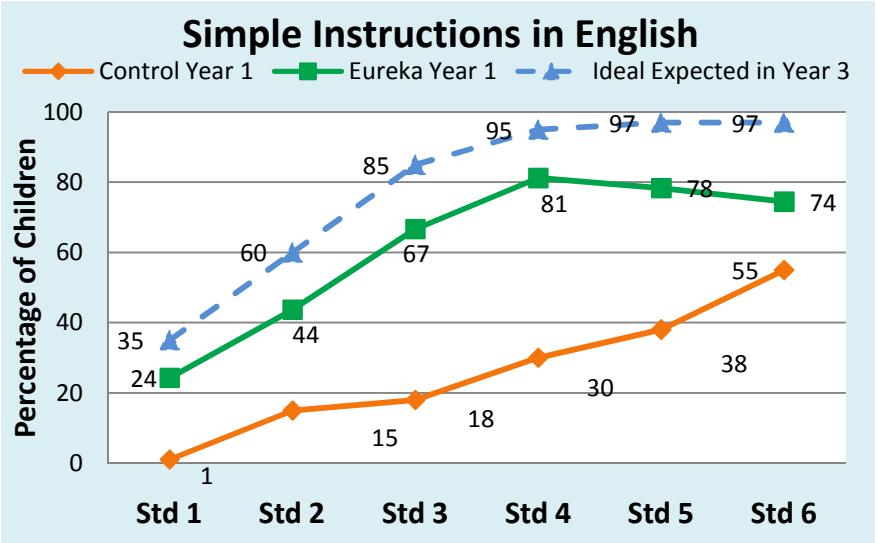
In English, the Eureka program focused on several things: building up a larger vocabulary, getting children to understand simple instructions and answer questions and teaching children to read words and sentences.

As the bar chart shows, the English Vocabulary has shown a very large jump. Except in Std 6, control does not show a significant jump in English Vocabulary. The line chart shows the clear value added by the Eureka English program.

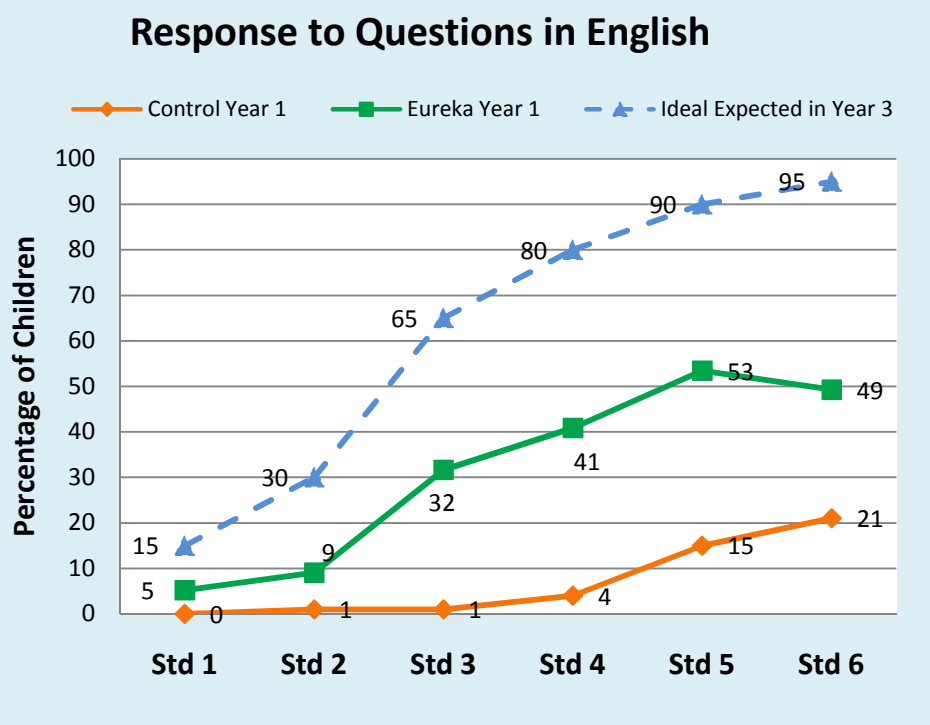


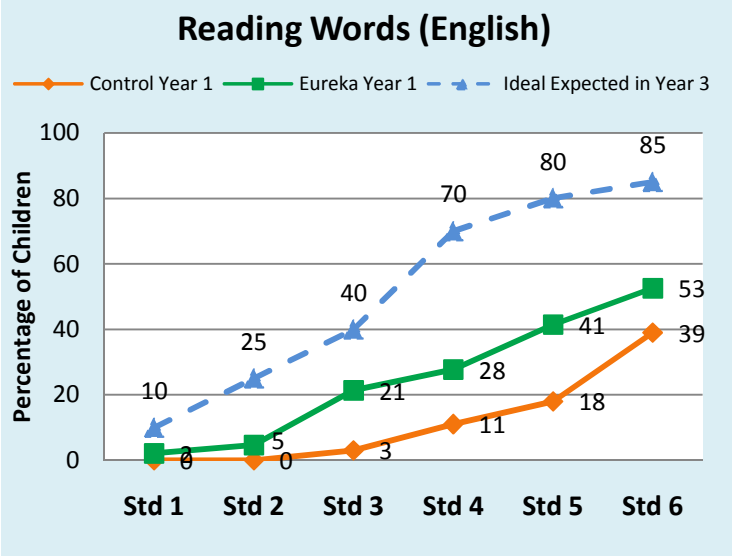
Vocabulary is directly linked to exposure and so we can expect that in the coming year, as children in Std 3-5 start at higher levels, they will add to their vocabulary substantially. But the lower increase in Std 6 needs some more looking into. Probably the sharp increase in Std 6 in Control villages is because of a focused Govt program in Std 6. We need to find out more about what was done in Std 6 in the Control Villages and possibly build on it further.

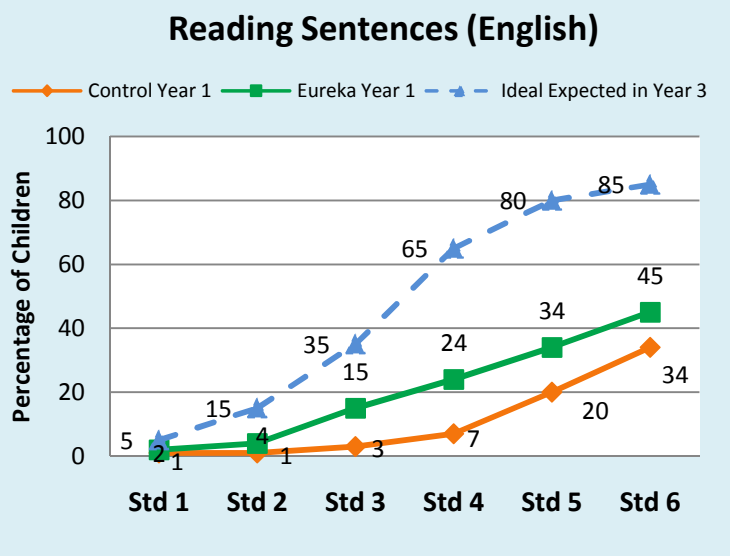
Percentage of children who understand simple instructions in English is 30-50% higher in Eureka villages than in Control Villages. The chart shows Std 2 children in Eureka villages have accelerated their learning by more than three standards! Such a huge jump in learning implies that school provides very little inputs on this skill. Again here, we need to research why Std 5 and Std 6 children are not showing as much improvement.



Understanding and responding to questions is probably the most important English skill the Eureka program is teaching children. And as the chart shows, **there has been a significant rise in the number of children who can understand and respond to questions in Eureka villages (both absolutely and when compared with control villages).** As in most skills, the first phase of improvement is easier than the later phases and given the large gap between expected and achieved, we have to look at how to get children who haven't yet picked up this skill to start doing so in the coming year.



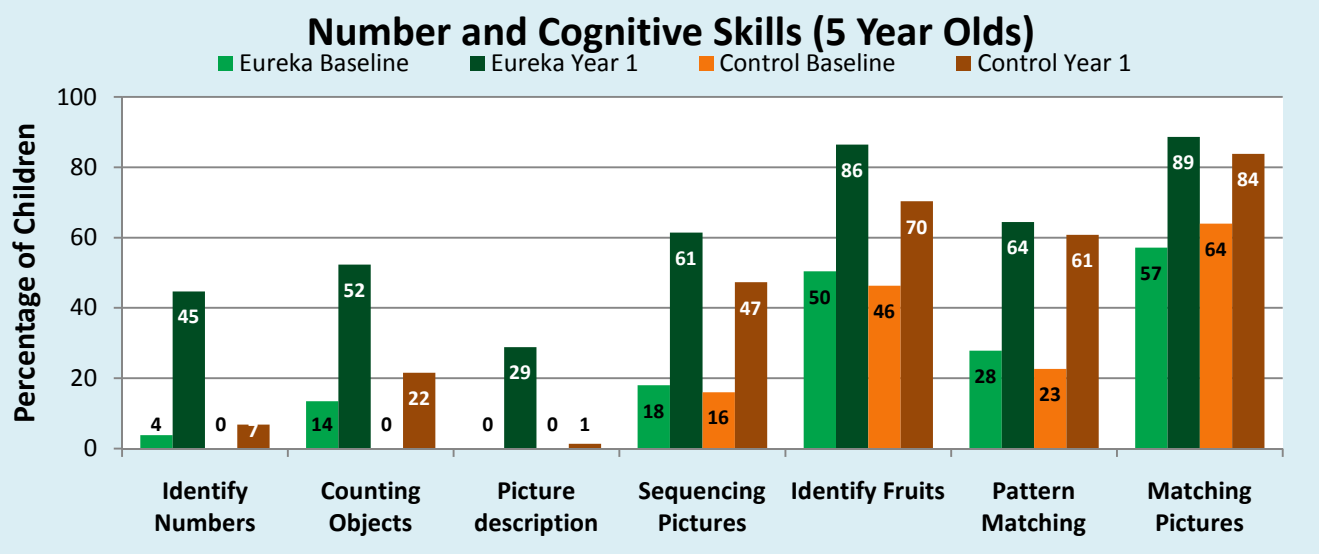


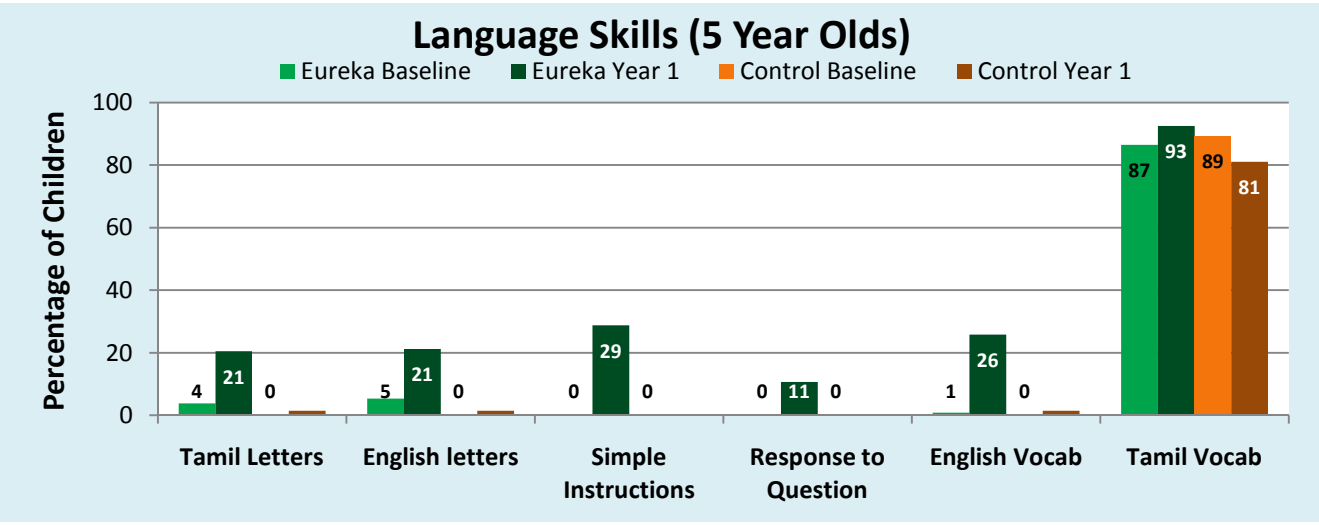


In English Reading, there has been good progress in the Eureka villages in Std 3-6 in both Reading Words and Reading Sentences. But Std 2 children are performing only on par with Control children. (Std 1 ideal expectation is itself low on these skills). In Std 2, we expect a much larger number of children to achieve these skills, but this has not yet happened. We will have to look at how English Reading can be accelerated in Std 2.

Pre-primary Evaluation Findings

The Eureka pre-primary program has both age 4-5 children. The goal of the pre-primary program is to ensure that children get good quality early education that prepares them for school and for learning better. Accordingly, we have used evaluation tools that are based on World Bank's School-Readiness Indicators (SRI). We have also looked at a few additional parameters to measure number and language concepts. The bar charts below show the performance of the children in Eureka and Control villages.





In most cognitive and language skills (identifying numbers, counting objects, picture description, Tamil and English letters, simple instructions, etc), children in Eureka villages are doing much better than in the Control villages. But in three skills – Pattern Matching, Matching Pictures and Tamil vocabulary – children in Control villages are doing as well as in Eureka villages. This means children anyway learn these skills from their environment and we need not focus on these skills as much in our program and can instead strengthen other skills. Of course we need to study this further to ascertain this is indeed the case, before a decision is made to shift the program's focus from these skills.

Summary: Evaluation Findings

The purpose of this external evaluation is two-fold:

(1) To understand the value add of the Eureka program
(2) To learn lessons that are useful for course correction and for sharpening the focus of the Eureka program.

To do this effectively, we have looked at the evaluation results using three dimensions:

(1) Comparison between the baseline and year 1 performance of children
(2) Comparison between Eureka villages and Control villages
(3) Comparison between Eureka villages and an 'Aspirational Target' to be achieved by Year 3.

This allows us to get a deeper insight into what has been happening in the Eureka villages and what happens 'normally' helping us gain a better understand of the value added by the Eureka program. This also helps us identify areas where we need to improve our focus.

Overall, the evaluation adds to the growing evidence that children in TN government schools are significantly lagging behind expectations on almost every skill and urgent measures are needed to remedy the situation. The evaluation also demonstrates that focused goal-oriented learning interventions like the Eureka program do make a huge impact on children's learning outcomes.

From the evaluation data we have seen that:

1. In all skills and all standards, there has been a large improvement in Eureka villages from the baseline in children's skills at the end of Year 1.
2. In most skills and most standards, Eureka villages have performed much better than Control villages. Often the improvement has meant a learning acceleration of more than 1 year.
3. In Std 3-5, the improvement in all skills – Tamil, English, Math – in the Eureka villages has been quite substantial and much higher than control improvements. In Std 6, though Eureka villages still shows a substantial improvement over control, the performance is lower than it is in Std 5. This needs to be looked into.
4. In Std 1-2, Eureka villages perform almost on par with Control villages – particularly in the lower level skills in Tamil and Math. And in most cases, the performance is much less than the 'Aspirational Target'. The reason for this weaker performance in Std 1-2 needs to be studied further. Even more importantly, the Eureka program needs to sharpen its focus on Std 1-2 and ensure much higher learning jumps happen in Std 1-2 in the coming year.
5. The pre-primary program has also shown a large improvement in both absolute terms as well as relative to Control villages. In a few skills, the value-add of the Eureka program is lower as children learn these skills anyway. So we could possibly re-focus our efforts on other skills.
6. The data has also highlighted several areas that need further research and case-building – some of the research questions that need to be looked into were discussed along with the findings.

The evaluation has clearly demonstrated the Eureka program's substantial impact children's learning. At the same time one must remember that our larger goal is to improve learning levels of ALL children and not just in Eureka villages. The low performance in Control villages indicates the overall poor learning levels in the state. So even as we prove the value add of the Eureka program, we must work on leveraging it to improve learning levels of children in every village.