STATUS OF TELUGU LANGUAGE LITERACY ENHANCEMENT PROGRAM:
MEDAK DISTRICT OF TELANGANA STATE, INDIA

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Introduction
The agreement to launch a process to develop Sustainable Development Goals (SDGs) was one of the main outcomes of the Rio+20 Conference. The SDGs are meant to build upon the current Millennium Development Goals (MDGs) and align with the agreed upon focus areas, shaping the post 2015 agenda. The ‘unfinished’ business of the MDGs must remain a priority post 2015, as 57 million children are still out of school including 31 million girls, due to financial, social, or physical reasons. ² The MDGs focused on access to primary education, with less attention given to quality and as a result

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“many of the children in schools are receiving an education of such abysmal quality that they are learning very little” and therefore are unable to advance to higher levels of education and employment.\textsuperscript{3} To illustrate this point, in East Africa, just 1 in 6 students in Standard 3 of primary school passed a Standard 2 English test (Uwezo, 2012). 250 million young people are unable to read, write, or do basic math, with 130 million of them already enrolled in school (UNESCO, 2014). This learning crisis is not a one-country phenomenon as recent evidence on learning levels show that this trend is visible in more than just a handful of countries (Beatty and Pritchett, 2012).

Recent trends from East Africa suggest that in Kenya 11 out of 100 children in class 4 cannot do simple class 2 division (UWEZO Kenya, 2012). Furthermore, 7 out of 100 can neither read a simple English nor a Kiswahili story. UWEZO tests results from Kenya shows that nationally only 3 out of 10 children in class 3 can do class 2 work. UWEZO Uganda (2011) has a similar story to tell. In Uganda at least 9 out of every 10 (92%) of all children in P3 could not read a P2 English level story text. The report also shows that of all children in P3 who could read a P2 English level story text, about 9 out of every 10 could comprehend the story implying that at least 1 out of every ten children could not comprehend the story. Results from UWEZO Tanzania (2011) are not encouraging either. Only 3 out of 10 Standard 6 pupils can read a basic story in Kiswahili and only 1 out of 10 Standard 3 pupils can read a basic story in English. The results are no better in mathematics. Only 3 out of 10 students can add, subtract and multiply.

These discouraging trends are repeated over and over again in multiple contexts. In countries such as Mozambique and Nepal more than 50% of the children are not able to read a single word of one-paragraph story after being in school for two years (Pritchett and Banerji, 2013).

\textsuperscript{3}UNESCO, 2013. Pg. 13
\textsuperscript{4} In Kenya, grades and standards are called class.
\textsuperscript{5} In Uganda, P3 or Primary 3 is equivalent to Grade 3 or Standard 3 in other countries.
\textsuperscript{6} In Tanzania, Standard 3 is w=equivalent to Grade 3 in other countries.
Eastern Africa Consortium for Monitoring Education Quality (SACMEQ) data shows that less than 40% of the children attending Grade 6 have reached the reading proficiency levels required at the Grade level in countries like Malawi, Zambia, Namibia, Mauritius, Zimbabwe and Kenya (Pritchett and Banerji, 2013). The same unfortunate story is repeated in mathematics literacy.

The developing country average Trends in International Mathematics and Science Study (TIMSS) figures show that India has the lowest score on the latest round of TIMSS. The India learning levels trends are been more disheartening as they show a downward trend in learning levels. ASER tests in 2011 reports that not only are the children not able to perform at grade level, the overall learning levels have decreased over the past years (ASER, 2011). ASER shows that 50% of the children in Standard 57 are not even able to able to read a Standard 2 level text (Chavan and Banerji, 2012). This means that children have spent 3 additional years of schooling with half of them not learning even the basics. ASER 2011 data shows that 65% of the children who were enrolled in Std. 4 are at least 3 years below grade level even after 4 years of schooling (Chavan and Banerji, 2012). The average years of schooling in South Asia is 9.2 for girls and 10.2 for males8. Given this rate, the students have on average 9 years to learn what they can before they end their education. But if they are learning rate has a 3 year lag, by the 9th year, there is a high probability that the child would have fallen behind what he/she is expected to learn at grade level.

A study conducted in 2014 in Medak district revealed lagged learning as well (Columbia Global Center, Mumbai, 2014). A total of 79 students were assessed using the ASER India tests in Telugu. The results revealed that by Grade 3 all students were able to identify all the letters of the Telugu alphabet, and as they progressed to higher grades the number of students who could read words, sentences and stories increased, however the

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7 Grade is called Standard (Std) in India.
8 http://www.unicef.org/rosa/education.html
number of students who understood the meaning of the words or sentences were still minimal. By Grade 5 the situation was better but still around 80% of students could understand Grade 2 level sentences in Grade 5. By Grade 4 and 5 all children should be able to read Telugu fluently and understand the meaning of the words and sentences because they are all Grade 2 level text.

**Literature review on how do children learn**

Since 2011, a number of experimental reading methods have been financed. Examples are the HALI and the Aga Khan projects of Kenya (e.g., Jukes et al, 2014). Many such programs have modest outcomes; differences between experimental and control groups may be statistically significant but may have little practical utility. There is much concern among donors about these results.

Programs of modest outcomes have focused in the past on invented writing, vocabulary development, and meaning. By contrast the proposed study will maximize reading practice and feedback while teaching the letters, in expectations of reduced reaction time and increased speed (see learning curves in Pirolli and Anderson, 1985). When students can decode, they may learn writing and vocabulary faster. The emphasis on identification speed over meaning may seem counterintuitive, but other studies also suggest it creates efficiencies (Jukes et al., 2014).

Pilots developed on the basis of memory functions have shown very good results. In the Gambia, for example, and only after 50% of the lessons taught on average. The percentage of first graders knowing at least 80% of the letters was 69% in the Pulaar language and 57% in Wolof (target was 85% of children; Abadzi, 2013). Similar progress was noted in Egypt after six months of application in grade 2. Word and text reading fluency rates doubled in comparison to rates obtained two years earlier (from 7 to 15 and from 11 to 21 words per minute respectively; syllable reading tripled from 10 to 28 syllables per minute. By contrast, the same measures in control schools improved only by about 27%. The percentage of students reading 0 correct words was cut by half in project schools (from 44% to 21%) while in control schools it improved only by 10% (USAID, 2012).
Egyptian program has been scaled up nationwide, while the Gambian pilot has been expanded.

Research suggests that students, particularly in transparent orthographies, or consistently spelled languages, acquire automaticity most easily by starting from individual letters, combining them in increasingly larger chunks, and getting plenty of practice in decoding them (Abadzi 2013). Feedback is an essential part of the process. Due to working memory capacity limits, students must attain a minimum reading speed in order to understand text. The students must become competent in quickly identifying individual letters and sounds, then composing them. Unlike English, mere knowledge of letter sounds and practice in composing them reliably evokes Telugu words (Seymour et al, 2003). In addition, letter spacing and fonts must be optimized, as suggested by USAID-sponsored research (DeJongh, 2014). A method combining these elements should teach fluent and effortless reading to nearly all children.

Programs combining many or most of these information processing features have been tested in some countries, such as the Gambia and Egypt (Zafeirakou, forthcoming; Abadzi 2013) and have shown very good results. In the Gambia, for example, only after 50% of the lessons taught on average, the percentage of first graders knowing at least 80% of the letters was 69% in the Pulaar language and 57% in Wolof (target was 85% of children; Abadzi, 2013). Similar progress was noted in Egypt after six months of application in grade 2. Word and text reading fluency rates doubled in comparison to rates obtained two years earlier (from 7 to 15 and from 11 to 21 words per minute respectively; syllable reading tripled from 10 to 28 syllables per minute. By contrast, the same measures in control schools improved only by about 27%. The percentage of students reading 0 correct words was cut by half in project schools (from 44% to 21%) while in control schools it improved only by 10% (USAID, 2012). The Egyptian program has been scaled up nationwide, while the Gambian pilot has been expanded.

Methods imported from high-income countries often include enrichment activities and multiple types of materials. Used by educated and competent teachers, these may be very helpful, but little-educated teachers may suffer from working memory overload (Feldon, 2007). For
this reason, the number of activities or steps that teachers needed to follow was minimized to those that maximize practice with known and detectable shapes.

Cognitive science research and experiences from the Gambia and other countries show that a great deal of attention must be placed in the earliest stages of reading. Children must first and foremost understand what letter symbols do. Many students may also have difficulty in identifying the same shape in different sizes and in focusing on a target letter among others (Franceschini et al. 2012; Marinelli et al. 2012). Data on these variables from low-income countries do not exist, so the team tried empirically to ascertain which letter sizes and shapes beginning students could view easily.

Cognitive science research suggests that this “traditional” method would teach students efficiently. People learn information by starting from small chunks, which are linked through practice into larger chunks. (See Abadzi 2013 for a review.) With practice, a specific part of the brain gets activated, which recognize words as if they were faces (Dehaene and Cohen, 2011). When students read about 45-60 words per minute, they can hold a message long enough in working memory to make sense of it. Then if they know the language, they understand.

**Implementation of the cognitive-neuroscience based research**

To be effective, teachers will be trained to follow a simple routine of 5-6 steps: (a) demonstrating the shape and sound of a letter, (b) showing combinations with existing letters, (c) ensuring that all focus on the target letter, (d) asking students to practice reading individually for about 20 minutes a day, and (e) passing by every student and giving corrective feedback for a few seconds. Even with 60 students in a class, a teacher may have sufficient time.

This reading method explicitly teaches students one letter at a time, in the same font but in different sizes in hopes of allowing students to differentiate between symbols, and creating perceptual size constancy. Instruction starts with the most frequent letters (as has been traditionally
done by Summer Institute of Linguistics), rather than following the traditional alphabetic order. One new letter is introduced every one or two days; focusing on the sound the letter makes, and slowly incorporating other letters to form chunks of two, three, and four letters. In response to research suggesting that people automatize the simplest shapes most easily, the lower- and upper-case letters are taught separately.

Teachers present the letter sounds, show students how to decode different letter combinations and words, and then spend about half the time supervising students’ individual reading. They were asked to pass by every student and offer feedback for at least a few seconds. This was in response to observations in various parts of the world that teachers may work with the few who can perform and neglect the rest (Lockheed and Harris, 2005). Every day, the students learned one new letter and practiced it in conjunction with previously learned letters. Initially the combinations are few and limited, but as more letters are introduced, words, phrases and sentences can be formed with previously learned letters.

**Adaptation of cognitive neuroscience based research for Telugu literacy**

The above mentioned theories have been applied in contexts using a primarily Latin script. Applying these theories in a Telugu speaking context required consideration of language-specific nuances, consultation with language experts, and some level of trial and error. To begin the textbook design and process, a letter frequency count of ‘primary letter forms’ was conducted using XX pages of a grade 5 level textbook in Telugu. Later, a count of ‘secondary vowel forms’ was also conducted. An earlier grade book was not used because it did not contain enough text for students to be able to read. Complex consonants were not included in the initial count of letters. A suggested letter frequency order was developed by the CGC team in consultation with language experts and native Telugu speakers, who advised pairing primary and secondary vowel forms together in consecutive chapters. Some infrequently used letters were left until the end of the book, and the most common vowels were taught earlier on. A suggested order of letters was developed as a draft, and then reordered
based on feedback and suggestions from language experts Dr. Helen Abadzi (University of Texas-Arlington) and Dr. Bhujanga Reddy (University of Hyderabad).

Much time was spent deliberating how to apply cognitive-neuroscience principles summarized by Abadzi (2013, 2015) on teaching literacy to a Dravidian language and using a non-latin script. The sheer number of characters, having two forms for each letter (primary and secondary), and other symbols such as *ashalant* and *anuswara* differentiated the approach taken to applying this methodology in India versus other contexts. Our team deliberated on how to include secondary vowel and consonant forms, how they should be taught, and whether or not they should be paired with their primary letter forms for sake of comparison. In many instances, secondary vowel forms appear more commonly than their primary vowel forms. However, teaching a secondary vowel form before introducing a primary vowel form did not conceptually make sense. There was also deliberation on when and how to include writing as a task, for an alphasyllabic script as Telugu visually differentiating between the letters could be complicated.

The premise of deciding the order of letters to be taught was to introduce the most commonly used letters as early on as possible in the supplemental book, rather than teaching in the traditional *barakhadi/varnamala* order. This way, common letters could be paired with each other to form meaningful words, where children can practice reading as early as possible. Learning the most frequent letters earlier enables them to read and recognize letters/words in their own settings earlier on. Thus, infrequently used letters such as were taught towards the end of the book content, irrespective of their order in the *varnamala/barakhadi* chart. Including these letters earlier on would not have helped students read familiar words any more, since they do not appear often.

Discussions with language experts, curriculum developers, teachers, and literacy specialists provoked many questions about the design and
structure of our book content. A draft of the book was created for the initial pilot, with the team noting questions about design and structure for observation and discussion with teachers. Some of the outstanding questions included below will hopefully be answered at the end of the pilot.

- Does one day per letter, and a review chapter every 4-6 letters suffice? Or is more time per letter needed in the beginning phases?
- What is the best approach to teaching primary and secondary vowel forms? Should they be taught in the same lesson, or as separate characters on separate days?
- What is the best visual way to format and present the secondary vowel forms? For the pilot, we chose to use a dotted circle to represent a letter and placed the secondary vowel form either above or below the circle. Does this configuration confuse the children, or is it intuitive?
- How much does the visual complexity of the characters impact our approach, and how can it be accounted for?
- Should short and long vowels be taught consecutively, or does that not matter?
- How appropriate was the order of the letters? Are there letters that should have been taught earlier or later in the sequence?
- What is the role of alternative characters such as anuswara and halant?

Customizing and creating training materials
The teacher training materials used in the Malawi and Rwanda pilots were adapted to fit the Indian context. The training framework remained the same, highlighting for teachers the purpose of the program, the science behind the approach, the methodology, and the general implementation plan. Teachers were taught to use the ‘I do’, ‘we do’, ‘you do’ teaching method, to break the habit of reading and repeating and allow students to have enough time to practice. As multi-grade teaching is common in the Indian context, the ‘you do’ portion of class time was emphasized as an
opportunity for the teacher to move throughout her classroom and work with other groups of students. Group-work and pairing of students by reading levels was also suggested. Teachers needed to be convinced of the merit of this methodology, which breaks the traditional varnamala/barakhadi style of introducing the alphabet. The current primary school curriculum in Telangana emphasizes a whole word approach to reading, which is contrast to this program’s approach.

Teacher training was conducted by CGC staff (Srinivas and Bharat) over the course of 2 days (morning and afternoon sessions) for 8 hours. All the school teachers from 20 selected schools were in attendance. All the teachers were shown very must interest on this concept of learning and reading program and we covered all the important topics such as, why literacy? who is involved in this program and just shown an simple exercise on powerpoint presentation (whole to part – or part to whole) / examples of Japanese Hiragana through the “whole word” method as an activity, and also discussed about the Importance of teaching individual letters, and also discussed useful of teaching non-sense words / Measuring Program Impact/ I do, We do, You do” and also shared More teaching tips.

**Development of a Telugu literacy Test**

No EGRA test existed in Telugu. In fact, no EGRA test existed for any of the Indian languages on which we could have modeled a similar test. Indian languages use non-Latin scripts and follow a different alphabetic structure. For the purposes of this project, an assessment test modeled off the Early Grade Reading Assessment (EGRA) was developed and adapted for the specifications of Telugu language. Three subtests were developed: letters (primary letter forms), syllables (consonants paired with secondary vowel forms into one character), and familiar words. Our local India-based team conducted a frequency count of the most common letters with two pages of typed text from a grade 5 book. The frequency percentage, letter positioning, and ordering guidelines outlined in the EGRA design specs were
followed as closely as possible. For the syllables subtest in Telugu, a frequency count of the vowels (in their secondary form) was conducted, and these common vowels were paired with most common consonants to fill in the 100-cell grid for the syllable test. A familiar words test was developed from a list of grade 1 Telugu textbook, we selected most simple letters to form a word found in a grade 1 Telugu textbook. Of the 110 words list, 50 simple words were selected by the district’s Academic Monitoring Officer (AMO) and content developer, who vetted the content as being appropriate for grade 1 level students.

The assessment administration guidelines and test formatting were adapted from the EGRA guidelines. The enumerator data collection sheets and student stimuli were used from the EGRA model, but adapted and translated to Telugu. This oral assessment was administered by CGC staff and one enumerator, both of whom received Skype-training from the NY based Education team, and practiced piloting in the field with students from grade 1-3.
Figure 1. Letter recognition test
**Figure 2 Syllable Recognition Test**
### Data and Sampling

Jagdevpur block includes 41 schools in 4 geographic subgroups called Complex. Complexes are government-mandated groups to ensure administrative convenience to conduct trainings etc. Out of the 41 schools,
30 schools were chosen to collect the data based on high enrollment numbers in early grades. Around 10% of the enrolled students in grades 1, 2 and 3 were administered the Telugu literacy test. A total of 252 student test data was collected.

The baseline results are as follows:

**Baseline Results**

Table 1. Reading Accuracy Measure in Telugu

<table>
<thead>
<tr>
<th>Grades</th>
<th>words_accuracy</th>
<th>syllables accuracy</th>
<th>letters_accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.49</td>
<td>6.71</td>
<td>45.33</td>
</tr>
<tr>
<td>2</td>
<td>27.69</td>
<td>40.05</td>
<td>67.51</td>
</tr>
<tr>
<td>3</td>
<td>54.05</td>
<td>60.85</td>
<td>78.13</td>
</tr>
<tr>
<td>Total</td>
<td>22.61</td>
<td>27.14</td>
<td>58.15</td>
</tr>
</tbody>
</table>

Table 1 provides the basic reading fluency indicators. Percentage of accurate words out of the total attempted increased as the grades progressed. However, by grade 3, only about half of the words are accurately spelled out. Similarly, Letter accuracy increased over the years, however, it does not reach 100% even in grade 3, when in Grade 3 the students are supposed to read connected texts and understand the meaning. Syllable accuracy picks up by grade 3, but does not meet the 100% measure even by grade 3.

Table 2. Reading Fluency Measure

<table>
<thead>
<tr>
<th>Grades</th>
<th>Words per min</th>
<th>Syllables per min</th>
<th>Letters per min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.02</td>
<td>2.21</td>
<td>11.73</td>
</tr>
<tr>
<td>2</td>
<td>3.84</td>
<td>10.12</td>
<td>21.25</td>
</tr>
<tr>
<td>3</td>
<td>10.25</td>
<td>23.28</td>
<td>32.65</td>
</tr>
<tr>
<td>Total</td>
<td>3.86</td>
<td>9.02</td>
<td>18.87</td>
</tr>
</tbody>
</table>

Table 2 reports per minute reading rate. US benchmark for fluent English readers is 60 words or higher. Abadzi (2013) suggests that when students
read about 45-60 words per minute in their local language, they can hold a message long enough in working memory to make sense of it. Then if they know the language, they understand. Therefore by any standards, the students are doing worse in all three categories. Therefore the students are not fluent readers and it is most likely that that the words that they are able to read, they don't know their meanings.

Table 3: Number and Percentages of children who cannot read either the first row of the letters, or the first row of syllables or the first row of words.

<table>
<thead>
<tr>
<th>Grades</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can Read</td>
<td>11 (8.14%)</td>
<td>20 (35.08%)</td>
<td>41 (68.33%)</td>
<td>72 (28.57%)</td>
</tr>
<tr>
<td>Cannot Read</td>
<td>124 (91.85%)</td>
<td>37 (64.91%)</td>
<td>19 (31.66%)</td>
<td>180 (71.42%)</td>
</tr>
<tr>
<td>Total</td>
<td>135 (100%)</td>
<td>57 (100%)</td>
<td>60 (100%)</td>
<td>252 (100%)</td>
</tr>
</tbody>
</table>

Table 3 reports the number and percentages of children who are not able to read either the first full row of letters, first full row of the syllables or the first full row of the words. We are labeling these children as children who cannot read. 91 percentage of the children cannot read at the end of grade 1, 65 percentage of children cannot read at grade 2 and 32 percentage of children cannot read in grade 3.

**Discussions**

The result suggests that even during the end of grade 1, children are not fully familiar with all letters and syllables of the Telugu language. However,
an excerpt of what the children are expected to read at the end of grade 1 is given below. However, the expectations are far above the actual reality of what children are able to read.

Grade 1 textbook start with sentences that teachers read out to the students. The children are given a story in a familiar environment, but very little practice on letters and their sounds. For children who have had very little exposure to print before, which is majority of the children in rural areas, practice of listening to the sounds of the letters and recognizing their shapes is key. For this they need 2-3 hours of practice each day. The backlog on learning starts from day 1 of First grade since the textbook doesn't give much practice.
Letters need to be introduced one at a time for the child to recognize the shape and the associated sound. This needs to be repeated many times till the shape and the sound becomes automatic to the learner. Each letter then needs to be joint with other letters with the practice of sound. A lot of individual practice is needed with corrective feedback from the teachers. However, the current Telugu textbook does not leave a lot of room for practice. It starts with stories and assumes that an illiterate child will be engaged with the story, when he/she barely can read anything on that page. The pictures are supposed to grab the attention and make them interested in reading. However, this does not help in any reading practice.

Textbooks ought to be introducing each letter and slowly building from it go up to making a story. At this stage, the child recognizes the bits that form the words and words that are connected in a sentence and can try to figure out the meaning. With regular practice, the students become fluent readers and the shapes and sounds become very familiar to them.
Conclusions and Recommendations

The baseline results show a huge lag in where children are supposed to be versus where they actually are. For this literacy pilot to be successful, a lot depends on the implementation. Here are few suggestions- firstly, classes need to take place daily for 1 hour minimum. Second, teacher feedback would be critical to the program. Once the initial training is completed, ongoing demonstrations and classroom observations will help to provide corrective feedback to the teachers. Third, videos of good practices to be shared with the teachers on a regular basis will be key to on-going professional development of the teachers. Fourth, each child should have his/her own individual book in the class. Therefore adequate books need to be printed. Fifth, children need to be sitting in a “U” form in class for teachers to give adequate attention to all children. Sixth, teachers should limit their demonstration for only 10 minutes in class, the majority of the time should be spent on individual practice by the students using their books. The teachers should go around providing corrective feedback to all students. Seventh, writing is not a major focus of this exercise. Therefore teachers should be asked to focus on letter-sound recognition and reading rather than asking children to spend time writing the letters.

For many centuries cognitive-neuroscience has shown how best children learn their local languages. This pilot is based on some key cognitive-neuroscience based principles. The method has been tried and tested in in other countries such as Gambia and Malawi. In a short duration- about a 100 days children learn how to read. After this initial time is over, students should be able to read sentences fluently. They can then move on to more complex texts and read their prescribed textbooks. The supplemental book acts as a exercise book for ease in transition to the grade textbook in Telugu. Other languages like English could be introduced at this stage since they can use the skills acquired to learn a language (in this case Telugu) to learn a secondary language (English). Bi-lingual textbooks could be
developed to promote conversation English first leading on to reading and comprehension in English. The Telugu Language Enhancement Program has a great potential to be scaled-up. The current need is to ensure that the implementation is strong.

References


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