Developing Teaching Learning Material: Math
Teaching at the Right Level

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Introduction

Math is often treated as a difficult subject as it has many abstract topics that cannot be easily understood by children. However, with ‘concrete’ teaching learning materials (TLM) such as number charts, multiplication table charts, etc., children in TaRL interventions can understand and follow mathematical concepts quickly. Access to appropriate TLM plays a crucial role in the teaching and learning of difficult mathematical concepts.

This note provides direction on:
- How to create the math TLM for TaRL programs.
- How to modify the materials according to the local context.

Here are some points to keep in mind when developing the math TaRL TLM:

- **Materials should be contextualized:** TaRL interventions are adapted to the local contexts and needs of the program. This means ensuring that the TLM is created in the appropriate languages, and uses information that is relevant to the child’s surroundings. For instance, Word Problems should use simple examples of objects and experiences that children are familiar with.

- **Materials suit the needs and budget of the program:** Diverse country contexts can have different prices for printing and other material-related costs. Keep these costs aligned with the program’s budget. If needed, adapt the materials to reduce cost or modify how the resources are distributed. For instance, in low-resource settings, blank papers may be substituted with pieces of cardboard. In such settings, materials may be created using locally available resources instead of being printed. Based on the program, some materials may be created by teachers in classrooms. Even children may be involved in creating some materials. It is important to note that such modifications must be made keeping in mind the context and in consultation with individuals who have been trained in the TaRL approach.

- **Materials are age and level appropriate:** Usually, TaRL interventions target children in grades 3 to 5. This means working with children aged 8 and older. However, in some contexts, children who are slightly older or younger may also be included in TaRL sessions. As such, think about the ages of the children engaging with the TLM. Do your materials reflect the concerns and familiar surroundings of the children you work with? For instance, the experiences and realities of a 13-year-old child may vary a lot from that of an 8-year-old.

- **Materials are open to revision:** Developers must bear in mind that material creation is an iterative process, which requires observation of how children interact with materials for future revision. Regularly revise and update your materials.
Who can be involved in the development of the TaRL material?
The teaching learning materials developed for TaRL programs are easy to create and use materials accessible in the local context. However, the creation of these materials requires a familiarity with the TaRL approach as the materials are prepared based on specific TaRL-related guidelines. Therefore, it is recommended that individuals familiar with the methodology should be involved in preparing the materials.

In certain contexts, children may be asked to copy materials such as oral addition and oral subtraction charts in their notebooks. However, this is done intentionally to help learners to draw the chart to get hands-on experience, and the learners can also visualize the patterns in the chart. In low-resource settings, children may be asked to create their charts if printing is not possible.

Number Chart

<table>
<thead>
<tr>
<th>1 to 100 Numbers</th>
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<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
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<td>11 12 13 14 15 16 17 18 19 20</td>
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<td>21 22 23 24 25 26 27 28 29 30</td>
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<td>31 32 33 34 35 36 37 38 39 40</td>
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<td>81 82 83 84 85 86 87 88 89 90</td>
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<td>91 92 93 94 95 96 97 98 99 100</td>
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</tbody>
</table>

**Purpose:** Number charts help children to recognize numbers from 1 to 100.

**Related Activities:** Number charts can be used for conducting activities related to counting numbers, making numbers, developing number sense, and playing games with numbers.

**Distribution:** A set for each class.
- **Class Wise:** One number chart, A3/Calendar Size
- **Child Wise:** As per the number of children, A4 Size

Alternative Options

If printing the Number Chart is not an option, consider the following ways to adapt the material to your needs and contexts:

- **Class Wise:** Ideally, the Number Chart should be visible to the whole class.
  - You can draw on the wall with paint.
  - Depending on what is available in the surroundings, you can also make the Number Chart on flip charts, plastic or paper bags, cardboard boxes, etc.

- **Child Wise:** Ideally, each child should have one Number Chart. However, there are other ways of creating and distributing the Number Charts for diverse contexts.
  - Distribute the number chart in pairs.
  - Ask the children to draw the chart in their own notebooks.
  - Distribute the number chart to the groups.
Expansion Chart

<table>
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<tr>
<td>1000</td>
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<td>8000</td>
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<tr>
<td>9000</td>
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</table>

**Purpose:** The expansion chart helps children to recognize the expanded form of a number

**Related Activities:** Expansion Chart can be used for activities like Expansion Chart Reading and more.

**Distribution:** A set for each class.
- **Class Wise:** One number chart, A3/Calendar Size.
- **Child Wise:** As per the number of children, A4 Size.

**Alternative Options**

If printing the Expansion Chart is not an option, consider the following ways to adapt the material to your needs and contexts:

- **Class Wise:** Ideally, the Expansion Chart should be visible to the whole class.
  - You can draw on the wall with paint.
  - Depending on what is available in the surroundings, you can also make the Expansion Chart on flip charts, plastic or paper bags, cardboard boxes, etc.

- **Child Wise:** Ideally, each child should have one Expansion Chart. However, there are other ways of creating and distributing the Expansion Charts for diverse contexts.
  - Distribute the Expansion Chart in pairs.
  - Ask the children to draw the chart in their own notebooks.
  - Distribute the Expansion Chart to the groups.
Oral Addition and Oral Subtraction Charts

**Purpose:** Oral Addition and Oral Subtraction Charts of numbers up to 18, help children to do addition and subtraction operations quickly. These charts will also help them understand certain patterns.

E.g. 17 - 8, 16 - 7, 12 - 3 are all equal to 9
5 + 4, 6 + 3, 7 + 2 are all equal to 9

**Related Activities:** These charts can be used for activities involving oral operations.

**Distribution:**
- **Class Wise:** One Oral Addition and Oral Subtraction Charts each per class, A3/Calendar Size.
- **Child Wise:** Each child in the class should receive one Oral Addition and one Oral Subtraction Charts, A4 Size.

**Note:** While developing these resources remember the following
- **Oral Addition Chart:** Only write numbers from 1 to 9 in the first row and column.
- **Oral Subtraction Chart:** Only write numbers from 10 to 18 in the first column and numbers 1 to 9 in the first row.

**Alternative Options**

If printing the Oral Addition and Oral Subtraction Charts is not an option, consider the following ways to adapt the materials to your needs and contexts:

- **Class Wise:** Ideally, the Oral Addition and Oral Subtraction Charts should be visible to the whole class.
  - You can draw them on the wall with paint.
Depending on what is available in the surroundings, you can also make the Oral Addition and Oral Subtraction Charts on flip charts, plastic or paper bags, cardboard boxes, etc.

- **Child Wise:** Ideally, each child should have one Oral Addition and one Oral Subtraction Chart. However, there are other ways of creating and distributing charts for diverse contexts.
  - Distribute the Oral Addition and Subtraction charts in pairs.
  - Ask the children to draw the charts in their own notebooks.
  - Distribute the charts to the groups.

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**Oral Multiplication Chart and Multiplication Table Chart**

**Oral Multiplication Table Chart**

| 2 x 1 = 2 | 3 x 1 = 3 | 4 x 1 = 4 | 5 x 1 = 5 | 6 x 1 = 6 |
| 2 x 2 = 4 | 3 x 2 = 6 | 4 x 2 = 8 | 5 x 2 = 10 | 6 x 2 = 12 |
| 2 x 3 = 6 | 3 x 3 = 9 | 4 x 3 = 12 | 5 x 3 = 15 | 6 x 3 = 18 |
| 2 x 4 = 8 | 3 x 4 = 12 | 4 x 4 = 16 | 5 x 4 = 20 | 6 x 4 = 24 |
| 2 x 5 = 10 | 3 x 5 = 15 | 4 x 5 = 20 | 5 x 5 = 25 | 6 x 5 = 30 |
| 2 x 6 = 12 | 3 x 6 = 18 | 4 x 6 = 24 | 5 x 6 = 30 | 6 x 6 = 36 |
| 2 x 7 = 14 | 3 x 7 = 21 | 4 x 7 = 28 | 5 x 7 = 35 | 6 x 7 = 42 |
| 2 x 8 = 16 | 3 x 8 = 24 | 4 x 8 = 32 | 5 x 8 = 40 | 6 x 8 = 48 |
| 2 x 9 = 18 | 3 x 9 = 27 | 4 x 9 = 36 | 5 x 9 = 45 | 6 x 9 = 54 |
| 2 x 10 = 20 | 3 x 10 = 30 | 4 x 10 = 40 | 5 x 10 = 50 | 6 x 10 = 60 |

**Multiplication Table Chart**

**Purpose:** The Multiplication Table Chart helps children to recite the multiplication table for numbers from 1 to 10. It also helps them understand certain patterns.

E.g. 6 x 7 = 42 and 7 x 6 = 42.

3 x 4, 4 x 3, 6 x 2 and 2 x 6 are all equal to 12.

**Related Activities:** These charts can be used for activities involving multiplication operations.

**Distribution:**

- **Class Wise:** One Multiplication Table Chart and Oral Multiplication chart each per class, A3/Calendar Size.
- **Child Wise:** Each child in the class should receive one Multiplication Table Chart and Oral Multiplication Table Chart, A4 Size.
Alternative Options

If printing the Multiplication Table and Oral Multiplication Charts is not an option, consider the following ways to adapt the materials to your needs and contexts:

- **Class Wise:** Ideally, the Multiplication Table Chart and Oral Multiplication Chart should be visible to the whole class.
  - You can draw them on the wall with paint.
  - Depending on what is available in the surroundings, you can also make the Multiplication Table Chart and Oral Multiplication Charts on flip charts, plastic or paper bags, cardboard boxes, etc.

- **Child Wise:** Ideally, each child should have one Multiplication Table Chart and one Oral Multiplication Chart. However, there are other ways of creating and distributing the charts for diverse contexts.
  - Distribute the Multiplication Table Chart and Oral Multiplication charts in pairs.
  - Ask the children to draw the charts in their own notebooks.
  - Distribute the charts to the groups.

Bundles and Sticks

**Purpose:** Simple sticks or straws can be used to help children with counting numbers, understanding place values, and solving basic operations. A bundle consists of 10 sticks tied together.

**Related Activities:** Bundles and sticks can be used in a variety of different operations and number-recognition-related activities. These include activities such as Numbers with Bundle and Sticks, subtraction with bundle and sticks, etc.

**Distribution:** A set for each class. Ideally, each class should have at least one bundle per child. E.g. 30 bundles (300 sticks) would be needed for a group of 30 children.

**Note:** Items similar to sticks may be used as substitutes. E.g., straws, chopsticks, etc.
- However, these objects should not be too small as they need to be visible to the class.
- Additionally, these objects should be easy to hold in a bundle.
- Ensure that the sticks are not sharp and harmful for the children.
Currency Notes/Play Money

**Purpose:** Play Money (1-10) is useful to teach children the expansion of bigger numbers along with their place value. They also help children understand how to read numbers.

**Related Activities:** Play money can be used in several number-recognition and basic operation-related activities such as Addition with Play Money.

**Material Distribution:** 3-5 sets per class. To be distributed group-wise (5-7 children in each group). Each set should ideally consist of 20-30 notes of different denominations.

**Printing Description:**
- Design and print play money of different denominations.
- Printing is optional for this activity.
- Printing play money in different colors is optional.

**Alternative Options**
- You can create play money on small pieces of paper.
- Ensure that you are using different denominations such as ones, tens, hundreds, and thousands.

**Note:** There is no relation between play money and the actual currency notes used in each context.
Number Diary

**Purpose:** A number diary is a simple resource, which helps children to engage with numbers in fun ways.

**Related Activities:** Number Diary Activities?

**Material Distribution**
- **Class Wise:** One number diary per instructor in each class.
- **Child Wise:** One number diary per child.

**Guidelines:**

Number diaries are easy to make, and even children can make their own diaries.

- To make this diary you will need blank A4 size papers, scissors, a stapler, and a pen/pencil.

- Take the blank paper of A4 size, and keep folding the paper until it looks like a small book. Make sure that you fold the paper enough times (4 times) to have a small page for numbers from 0-9.
• Staple two times on the top and cut all borders except the stapled border. You now have a diary.

• Now make a small cut in the middle so that you can divide the diary into two parts. Make sure you don’t cut all the way to the top.

• On each page of both parts, write one number from 0 to 9.

• With the help of this number diary, children can make any number between 1 to 99.
Number Expansion Cards

**Purpose:** Number Expansion Cards are resources to help children understand how different numbers are formed. They also help children to understand place value.

**Related Activities:** These cards can be used in activities related to expansion and understanding the concept of place value.

**Material Distribution:** There should be at least 4 to 5 sets in each classroom.

Class wise: One set per instructor.

Group wise: One set per group of children.

**Printing Description:**
- Design and print number expansion charts. These can be cut too.
- Printing is optional for this activity.
- Printing the materials in different colors is optional.

**Guidelines**
- Take cardboard or thick A4 Size paper.
- Draw the boxes as per the required place value and cut the flash cards with numbers such as 1000, 2000, 3000,……., 9000
- 100, 200, 300,……., 900
- 10, 20, 30, 40,……., 90
- 1, 2, 3,4, 5,……., 9

**Note:** While making the numbers they must put the cards on top of each other. For example, if the number is 9427 then they can use cards 9000, 400, 20 and 7.
Word Problems

**Purpose:** For TaRL operations-related activities, we often use word problems. This helps children to build their conceptual understanding. When children start linking these operations with word problems, they become more confident about applying their knowledge into practice.

**Note:** Since children with different reading levels engage with Word Problems, we encourage facilitators to read out these word problems multiple times during TaRL activities.

**Related Activities:** These word problems can be used in operations-related activities.

**Material Distribution:** Word Problems can be added to manuals, and even word problem question banks. Ensure that at least 4-5 sets of these word problem question banks are available per class.

**Printing Description:**
At the implementer’s discretion.

**How to create a word problem?**
- The word problem should be simple and should contain examples from children’s daily life.
- Try to create variations in the word problems.
- Try to keep the children’s learning level in mind while creating the word problem.
- These word problems can include operations such as addition, subtraction, multiplication, and division.
- **Example**
  - “John has 7 balloons. He spends one hour at the store and buys 3 more balloons. How many balloons does John have in total?”

**Note:** Extra information in word problems can distract the children. Some details aren’t needed to solve the problem. For example, children don’t need to know that John spent one hour in the store to know how many balloons he has.