# Language Worksheets Support Other Subjects

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*Words are, in my not-so-humble opinion, our most inexhaustible source of magic.*
- Albus Dumbledore (Harry Potter by JK Rowling)

When children are between the ages of one and five years, language is key to all his or her learning – cognitive thinking, social interaction and emotional development. However, as children enter school, language, unfortunately, becomes a 'subject', dealt with in isolation. We ignore the fact that children can assimilate concepts in maths, science and social studies only when they listen, talk, read and write about what they are learning. Without listening and reading skills, children cannot understand ideas, and only a strong foundation in speaking and writing skills can reflect their thinking process. As teachers and educators, we need to recognise that language skills are a prerequisite for understanding concepts in other subjects.

## Science

Some years ago, I visited a school where children were demonstrating science experiments. One girl was trying out an experiment on the effect of air pressure. She placed a light ball in a plastic funnel, and blew hard into the funnel, trying to make the ball float in the air. But however hard she tried, the ball was stuck to the funnel and refused to budge.



When the teacher asked her to explain the experiment, she quickly put everything down, folded her arms, and recited the explanation verbatim from the book. She ended the narration with the words, '...and that is why the ball floats in the air'. She then quickly sat down, relieved.

After the class, when I went up to her and asked, 'But the ball never floated up, did it?' She smiled and showing me the book, said, 'Yes, but this is the paragraph given in the book, no Miss? That is what we are *supposed to say or write*.'

The purpose of science education is to learn how to observe, record, reason and infer based on what we do and see. Science tells us to question the why and understand the how. Neither of these can be done if language skills are not integrated along with science learning. If language is used only to test one's recall of what is written in the textbook, science becomes a dull and difficult subject.

## Maths

Maths is fundamentally a language in which we translate between words and symbols. Maths statements are just a short way of representing a long string of words. It is ironic that we sometimes designate a separate place for language skills in maths, and call it, 'word problems'. The entire study of maths deals with translating words (verbal language) to short-form symbols that we can write, understand and manipulate easily. When we separate language skills and mathematical skills in the early years, children end up struggling when confronted with more complicated theorems, proofs, algebra and logical analysis in middle and high school.

## Social Studies

The study of social studies is to provide us with an identity - who we are, how we got here, and what valiant, sad or shocking events happened along the way. It provides us with a context to understand ourselves and empathise with others.

To truly learn social studies, we need to:

• Comprehend information
• Analyse (why, what if…)
• Separate facts from opinions
• Present arguments
• Make inferences
• Predict future trends

Each of these is closely related to language skills. If schools divorce language skills from social studies or view it as 'the job of the English teacher', the learning of history and geography becomes a series of unrelated facts – both boring and futile.
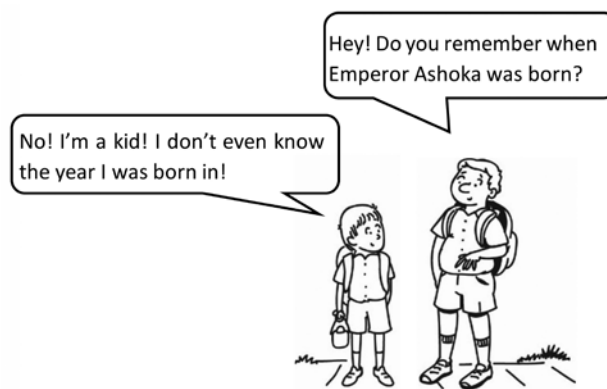


**Integrating language skills with subject learning**

To truly comprehend any concept, we need to be able to develop four key skills:

| Say what we read or listen to in our own words | Give examples and counter-examples | Relate it to real-life experiences | Apply it to different situations |
| --- | --- | --- | --- |
| *vocabulary, comprehension, sequencing* | *categorization, analogies* | *verbal reasoning, association* | *compare-contrast, analysis, inference* |

*Language skills needed*

There are many aids and tools that teachers use in classrooms. Of these, worksheets are the most used. In this section, we use the examples of worksheets to discuss how key language skills can play a role in the learning of any concept.

**Integrating language skills in worksheets for all subjects**

Before delving into how worksheets can be created in different subjects, let us look at some basic principles in creating worksheets:

1. Why: The most important factor to decide before preparing a worksheet is its purpose. We must decide if the purpose is conceptual understanding, skill-building, creative expression, skill reinforcement or assessment. For each of these objectives, the design of the worksheet will be completely different. So, it is very important to define the goal of each worksheet before we start on the content.

2. Who: To make an effective worksheet, we must know who we are designing it for. It is essential for the level of the worksheet to be

'just right' for the children who are going to use it. For children at the beginner level, a difficult worksheet will be demoralising, whereas, for children at more advanced levels, a simple worksheet would be uninteresting.

3. What: Before we start, we must define the learning goal of the worksheet as specifically as possible. For example, defining 'reading comprehension' as a broad learning goal is not very useful. We must break it down into more specific goals, such as 'finding similarities and differences', 'summarising key details' or 'expression in own words'. Only when we define a specific, simple and sharp learning goal can our worksheet help children achieve the required outcomes.

**Worksheets for science and social studies**

For the comprehension of science or social studies in primary school, children must be able to break down the text of the lesson and derive its meaning. Let us take an example of a passage from an environmental science (EVS) lesson on *Seed Dispersal.*

Plants make seeds that can grow into new plants. But if the seeds just fall to the ground under the parent plant, they might not get enough sun, water or nutrients from the soil. So, seeds need to be transported to other places, where they can grow. This is called *dispersal*. The most common methods of dispersal are wind, water, animals and explosion. Seeds from plants like dandelion and cotton are light and can be carried long distances by the wind. Trees along banks of rivers like the coconut tree use water to disperse their seeds. The seeds have a hard coat and float down the river. Many fruit plants disperse their seeds through animals and birds that eat the fruits and disperse the seeds in their droppings. Some plants, like peas and flax, have seed pods that pop open and scatter their seeds through tiny 'explosions'.

To help children understand the concept of seed dispersal, we can integrate key language skills in our worksheets, as shown in the example.

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**Section 1: Learning the Vocabulary**

*Note to teachers: Word meaning and association help children make connections and relate to the concept better*

DIS means *'in different directions'*          SPERSE means *'to scatter'*

DISPERSE = DIS + SPERSE, meaning, *'scatter in different directions'*

I) Using the meaning of DISPERSE, guess what the following sentence means:

The crowd **dispersed** as soon as the artist left.

(A)   People came together from different directions when the artist left.
(B)   People felt unhappy when the artist left.
(C)   People went away in different directions when the artist left.

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**Section 2: Expression in the child's own words**

*Note to teachers: This helps children understand the concept better and relate to it using real-life examples*

II) Think and write the answers in your own words.

You find a coconut lying on the banks of a stream.
Can you say its story in your own words? Use the questions below to help you.

(A)   Where was the parent tree of the coconut located?

(B)   How did the coconut travel to the bank where you found it?

(C)   Why did it not sink in the water? What helped it move away to a new place?

## Section 3: Sequencing

*Note to teachers: This helps children understand order of events in text and build a logical sequence in their minds.*

III) Sequence the sentences in the correct order. Write the correct number in the circle.

○ It is light and has small hairs on it that help it float in air.

○ The cotton seed is ready to leave the plant.

○ The seed lands on the soil in a different place and a new plant starts growing.

○ The seed flies off the plant and starts floating in air.

## Section 4: Giving counter-examples

*Note to teachers: If we truly understand something, we must be able to explain it, not just with examples, but also with 'what if' questions. This deepens comprehension.*

IV) Read the statement and answer the questions.

**All the apples from an apple tree fall directly below the tree and stay there.**

(A) Will the seeds from all the apples grow into trees? Why or why not?

(B) If yes, explain how. If not, explain what else the apple tree can do.

## Section 5: Reasoning and Inference

*Note to teachers: The skills of reasoning and making inferences help children understand implied information, even when it is not directly stated in the text.*

V) Pick the option that seems correct to you. Using it, write which dispersal method is best suited for apple seeds.

(A) Apple seeds can float or fly in air.

(B) Apple seeds have a hard coat so that they can easily travel through rivers.

(C) Apples are tasty and brightly-coloured to attract birds and animals.

**Apple seeds are dispersed through _____. (wind/water/animals/explosion)**

**Worksheets for maths word problems**

Learning maths is not just learning arithmetic. One of the main reasons that many children find maths difficult is that they fail to understand the words or context of the problems. Instead of prompting children to hastily 'apply the formula' or manipulate numbers, maths worksheets must lead to problem-solving using language skills.

Let us take the example of this worksheet on the concept of *Time*, a recurring topic in primary school.

Problem: Mohit started his test at 7:30 am and completed it two hours later. Two hours after Mohit finished his test, his mother returned home. What time did Mohit's mother return home?

The time now is…

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**Section 1: Learning the vocabulary**

*Note to teachers:* Children explore the meaning of the words in the problem to understand it better

I)  Fill in the blanks with the correct word **(Hint: Later = After   Earlier = Before)**

(A) _____ is the opposite of earlier.        (B) _____ is the opposite of before.

(C) _____ means the same as before.        (D) _____ means the same as after.

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**Section 2: Understanding through examples**

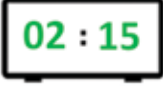*Note to teachers:* Children explore the meaning of the words with the help of specific examples

II) Compare the time on each pair of clocks. Fill in the blanks with the correct words – later or earlier. See the example done for you.

(A)
| 07 : 00 | a.m.
<u>later</u>

| 05 : 30 | a.m.
<u>earlier</u>

(B)
| 04 : 30 | p.m.
_____

| 08 : 00 | p.m.
_____

(B)
| 02 : 15 | a.m.
_____

| 12 : 30 | a.m.
_____

## Section 3: Sequencing

*Note to teachers: Sequencing events in the correct order is a key language skill that is extremely important to solve Math problems*

III) Read each statement given in sequence and write the time in the blank.

(A) Mohit starts the test. The time is now _____.

(B) 3 hours pass. The time is now _____.

(C) Another $\frac{1}{2}$ hour passes. The time is now _____. Mohit completes his test.

(D) 2 hours pass. The time is now _____. Mohit's mother returns.

Therefore, time when Mohit's mother returns is _____.

## Section 3: Visualizing text

*Note to teachers: Conversion of text to pictures helps children understand the meaning of the words and sentences in the Math problem.*

IV) Draw the story in the problem as a comic strip. Write your own dialogues.

| | | | |
|---|---|---|---|
| | | | |

### Worksheets for English comprehension

Even as other subjects integrate language skills to enhance concept understanding, English worksheets bear the responsibility of building vocabulary, comprehension and expression in the early years.

The problem in many English comprehension worksheets is that they encourage pattern-matching rather than the true understanding of the text. Pattern-matching strategies do not build comprehension skills. English comprehension worksheets must try not to allow children to guess the answers by just matching patterns in the text without understanding.

Let us take the example of a worksheet for English comprehension to illustrate the difference between a 'copy-paste' response and 'real comprehension' skills that we are looking for.

**Read this passage and answer the questions.**

A little girl goes to a farm. In the morning, she eats two eggs. Then, she feeds the goats some hay. In the evening, the girl plays on the hill with her dog. They run up and down the hill and have fun.

**Worksheet A ('copy-paste' response)**

1. Who goes to the farm?
   _____

2. What does the girl eat in the morning?
   _____

3. What does she feed the goats?
   _____

4. Where does she play in the evening?
   _____

**Worksheet B (tests comprehension)**

1. Who is at the farm?

   

2. What does the girl have for breakfast?

   

3. What do the goats eat?

   

4. Where does she go in the evening?

   

**Worksheet A** prompts a 'copy-paste' response. The child can match the words in the question with the words in the passage, and copy the sentences. Even with no understanding of the text, the child can answer correctly. This worksheet does NOT help in identifying learning gaps.

**Worksheet B** modifies the words in the questions and adds picture options. This compels the child to understand the passage and questions. Only if the child comprehends the text, he/she will be able to answer correctly. This helps the teacher identify what the child knows or needs help in.

Another example of a worksheet that encourages comprehension is given below. By compelling the child to visualise the text, it builds comprehension skills, rather than pattern-matching strategies to find the correct answer.

**English Worksheet**
**Purpose: Comprehension through visualization**

Four friends decorate a pumpkin.
- Karthik makes circles for the eyes. He draws a square for the nose. For the mouth, he makes an oval. Write K in the box next to his pumpkin.
- Priya makes triangles for the eyes. For the nose, she draws a circle. She then draws a rectangle for the mouth. Mark Priya's pumpkin with a P in the box.
- Mala decorates her pumpkin by making triangles for the eyes. She draws a star for the nose. For the mouth, she draws a rectangle. Write M in the box next to Mala's pumpkin.
- Vinod makes ovals for the eyes. He draws a triangle for the nose and a circle for the mouth. Write V in the box near his pumpkin.

**Harnessing the magic of words in every subject**

Teacher and Education Researcher, John Holt said, 'Learning is not the product of teaching. Learning is the product of the activity of learners.' For real learning, children must be able to read, comprehend, question, argue, reason and analyse every piece of information in the different subjects that they learn. Compartmentalising language skills and subject skills in different silos does not help this natural way of learning. Integrating language skills in every worksheet we create enables children to understand and connect with what they learn in science, social studies and maths.

When we harness the power of vocabulary and language skills in all subject worksheets and resource materials, we realise the significance of Dumbledore's statement that words are truly an 'inexhaustible source of magic', not only in our school education but also in life.

**Chandra Viswanathan** is the Founder-Director of English Learning Foundation (www.elflearn.com), an organisation dedicated to the mission of ensuring English skills for children, youth and adults all over India. Chandra and the ELF team have developed several innovative digital and print learning materials for English learning. The ELF English online and in-school programmes are being used by thousands of teachers, parents and children all over India. As part of the education non-profit, AID INDIA, Chandra has developed English content for first-generation learners that is being used in several hundred rural schools and after-school centres. With over 20 years of experience in education research, curriculum and training, she is a resource person for several government and private schools and NGOs. She may be contacted at chandra.aid@gmail.com