

The Discovery of X-rays

Except for a brief description of the Compton effect, and a few other remarks, we have postponed the discussion of X-rays until the present chapter because it is particularly convenient to treat X-ray spectra after treating optical spectra. Although this ordering may have given the reader a distorted impression of the historical importance of X-rays, this impression will be corrected shortly as we describe the crucial role played by X-rays in the development of modern physics.

X-rays were discovered in 1895 by Roentgen while studying the phenomena of gaseous discharge. Using a cathode ray tube with a high voltage of several tens of kilovolts, he noticed that salts of barium would fluoresce when brought near the tube, although nothing visible was emitted by the tube. This effect persisted when the tube was wrapped with a layer of black cardboard. Roentgen soon established that the agency responsible for the fluorescence originated at the point at which the stream of energetic electrons struck the glass wall of the tube. Because of its unknown nature, he gave this agency the name *X-rays*. He found that X-rays could manifest themselves by darkening wrapped photographic plates, discharging charged electroscopes, as well as by causing fluorescence in a number of different substances. He also found that X-rays can penetrate considerable thicknesses of materials of low atomic number, whereas substances of high atomic number are relatively opaque. Roentgen took the first steps in identifying the nature of X-rays by using a system of slits to show that (1) *they travel in straight lines*, and that (2) *they are uncharged*, because they are not deflected by electric or magnetic fields.

The discovery of X-rays aroused the interest of all physicists, and many joined in the investigation of their properties. In 1899 Haga and Wind performed a single slit diffraction experiment with X-rays which showed that (3) *X-rays are a wave motion phenomenon*, and, from the size of the diffraction pattern, their wavelength could be estimated to be 10^{-8} cm. In 1906 Barkla proved that (4) *the waves are transverse* by showing that they can be polarized by scattering from many materials.

There is, of course, no longer anything unknown about the nature of X-rays. They are electromagnetic radiation of exactly the same nature as visible light, except that their wavelength is several orders of magnitude shorter. This conclusion follows from comparing properties 1 through 4 with the similar properties of visible light, but it was actually postulated by Thomson several years before all these properties were known. Thomson argued that X-rays are electromagnetic radiation because such radiation would be expected to be emitted from the point at which the electrons strike the wall of a cathode ray tube. At this point, the electrons suffer very violent accelerations in coming to a stop and, according to classical electromagnetic theory, all accelerated charged particles emit electromagnetic radiations. We shall see later that this explanation of the production of X-rays is at least partially correct.

In common with other electromagnetic radiations, X-rays exhibit particle-like aspects as well as wave-like aspects. The reader will recall that the Compton effect, which is one of the most convincing demonstrations of the existence of quanta, was originally observed with electromagnetic radiation in the X-ray region of wavelengths.

Predicting

Predicting is an essential reading strategy. It allows learners to utilize info from the text to anticipate what will happen in the story. When making predictions, learners envision what will come next in the text, based on their prior knowledge. Predicting encourages kids to think ahead and ask questions actively. It also allows learners to understand the story better, connect to what they are reading, and interact with the text.

Making predictions is also a useful strategy to improve reading comprehension. Learners can make predictions about a story based on what they have already heard, read, or seen. This, in turn, will allow learners to become actively involved in the reading process. To decide if their predictions are correct, learners should be required to reread portions of the text to remember facts about the story's characters or events.

Picture walks can operate as a tool to organize info within a story, expanding a kid's comprehension. During a picture walk, learners can activate their prior knowledge and connect the story's visual images to their individual experiences.

Learners can also utilize a graphic organizer to predict the outcome of a story. Learners can do this by identifying clues within the text to predict how characters might behave and how the story's problems will be solved. When using a graphic organizer, learners can stay engaged in the story as they logically capture their thoughts. Educators need to encourage kids to record clues that either support or deny their predictions. Teachers can also allow learners to revise their predictions to reflect on the clues that are found within the text.

Making predictions encourages readers to utilize critical thinking and problem-solving skills. Readers are given a chance to reflect and assess the text, thus extracting deeper meaning and comprehension skills. Learners will also be interested in the reading content when they connect their prior knowledge with the new info being learned.

Content Area Examples

Reading

There are several activities that teachers can incorporate within their classroom, allowing students to effectively make predictions. To introduce this reading strategy, teachers can hand out photographs from either a newspaper or a magazine. Students will then make a prediction with the evidence from the picture, their prior knowledge, or examples from their own experiences.

Teachers can also create a prediction pail. When introducing a new story, students first take a picture walk and then make a prediction based on the title, illustrations, and diagrams. This allows students to use clues and evidence from the text to make accurate predictions. The children then write their predictions on a slip of paper and put them in the pail. Next, students read the story within their small reading groups. After the story is completed, they are able to share their predictions and make connections to the other responses that were shared.

Math

Students can make predictions based on patterns. When looking at a problem or example, students will be able to recognize different designs/outlines through repetition and observation. From this information, students will be able to make a prediction with the data that they collected to confirm their answer as they justify their reasoning.

Science

Predicting can be used in science when students conduct an experiment. For example, students may be studying a unit on plants and must predict what will happen to a plants growth if the amount of water is increased. Based on their observations and trials, students will be able to predict what will happen next as they gather data and support their answer with evidence.

Reading strategies: Inferring

The skill of inferring is a skill we do all day long, similar to “reading” people or “reading” a situation. If it has been snowing outside and some cars have snow on them and some cars do not, we infer that those without snow have been parked in the garage. Inferring is not only about reading expressions, tones and body language, it is about “reading” text, often said as, “reading between the lines” where the answers are not explicitly stated. Predicting is related to inferring, but we predict events, actions or outcomes that can be checked or confirmed as correct or incorrect by reading on or reading to the end of the story. I’ve heard it said that predicting is like thinking ahead but inferring is about looking back and reflecting about what has already been read.

The skill of inferring is closely related in the fields of science and literacy. As a reading strategy, inferring requires readers to use prior knowledge and the information stated in a text to draw conclusions. The web site Into the Book explains that when readers infer, they “think about and search the text, and sometimes use personal knowledge to construct meaning beyond what is literally stated.”

While inferring can be difficult for students, it is often necessary to understand the full meaning of a text. As with other reading comprehension strategies, students need explicit instruction in how to make inferences and when to apply the strategy. Teachers can support students as they develop proficiency with this skill through think-alouds, discussion of wordless picture books, and activities like charades.

In the science classroom, inferring is one of six basic science process skills identified by Michael Padilla (1990). Padilla describes inferring as “making an ‘educated guess’ about an object or event based on previously gathered data or information.” This is quite similar to the thought processes required while inferring about text, with the exception that the information used is from an object or event in the natural world, rather than a written document. Science education research demonstrates that teaching basic process skills such as inferring increases the level of student performance. Teachers can support students as they practice inferring through think-alouds, T-charts that link claims to evidence, and class discussion.

Whether you are teaching inferring as a reading comprehension strategy or science process skill, it is important to ensure that students have sufficient background knowledge of the concepts being addressed. In both reading and science, students combine personal knowledge with evidence (from the text or from an object or event) to generate inferences. Students lacking this background knowledge will struggle to make inferences, so taking the time to provide experiences that build sufficient knowledge is critical.

It is also important to ask students to explain the thought processes used to generate inferences. Questions such as *How do you know that?*, *How does the text support your statement?*, and *How does the data support your explanation?* help students link their claims back to concrete evidence.

Teachers can also help their students begin to differentiate between observations and inferences. Observations constitute concrete evidence or data while inferences are interpretation of that evidence or data. Scientists often interpret data in diverse ways, and readers can generate a variety of inferences from the same text. Allow time for students to share, discuss, and even debate inferences.

Finally, teachers should consider drawing student attention to the similarities between making inferences while reading and in science class. Students who see the parallels between the disciplines will be more likely to successfully apply the strategy across a diverse range of situations.

Guessing meaning from context

Guessing from context refers to the ability to infer the meaning of an expression using contextual clues. These clues may be purely linguistic or situational:

- Linguistic context: the linguistic environment in which a word is used within a text
- Situational context: extra-linguistic elements that contribute to the construction of meaning may involve background knowledge of the subject.

What this amounts to is that learners should be able to infer the meaning of an unknown word using:

1. The meaning of vocabulary items that surround it;
2. The way the word is formed;
3. Background knowledge of the subject and the situation.

Techniques for guessing

Texts are often full of redundancy and consequently, students can use the relation between different items within a text to get the meaning. Our prior knowledge of the world may also contribute to understanding what an expression means.

Guessing meaning from context in the IELTS exam is an important technique that will improve your reading skills and the speed with which you can read.

Obviously you do not have a dictionary in the exam so there are likely to be a lot of words from the reading text that you do not understand and you cannot check.

If you come across a word you do not understand, then you cannot spend a lot of time working out its meaning because you only have 20 minutes for each reading.

Therefore, guessing meaning from context is necessary.

This means work out what it means (or have a good guess at least) from the words that are around it and from the topic of the paragraph.

Take a look at this example:

It had been raining hard through the night so the ground was saturated.

What does 'saturated' mean?

You may already know, but if you do not, you should be able to have a good guess from the rest of the sentence.

It had been raining which means the ground must be wet. It was raining 'hard' so this means the ground is probably very wet.

saturated = completely wet

By doing this you are guessing meaning from context and you should try and use this technique for words you do not know.

It may not always be clear from the actual sentence and you may have to look at other sentences around the word.

However, only do this for words that seem important for an understanding of the text. If it looks like they are not, then leave it and move on with the reading. You probably won't have time to do it with every word, especially if you are at a lower reading level.

Guessing meaning from context - Practice

Look at the reading below. Some of the words are in italics and bold. They are quite difficult words so you may not know them.

Try to guess their meaning from the sentence it is in, or sentences around it, and from the topic of the paragraph.

When you think you have guessed, choose from the words below the reading.

Thai Museum Catalogues Opium Dreams and Nightmares
CHIANG SAEN, Thailand, Wednesday December 04 (Reuters).

1) First reactions to Thailand's giant new opium museum in the Golden Triangle are confused: pleasant surprise at cool air after the intense tropical heat, but then disorientation, shock, even fear. Visitors enter the 100-acre complex through a long, dark, mist-filled tunnel, which winds into the base of a hill past bas-reliefs of distorted human figures before emerging suddenly into bright sunlight in front of a field of poppies. "This is the mystery, the contradiction of opium," says Charles Mehl, head of research for the Mae Fah Luang Foundation, which has just completed the \$10 million museum. "Opium is one of the very best drugs we have for treating chronic pain and bringing relief from suffering. But it can also be one of the worst, destroying lives if it is used for recreation or exploited for commercial gain."

2) Built into a hillside by the Mekong River on the northern tip of Thailand, the museum lies at the heart of the Golden Triangle. Chiang Saen town is about 470 miles north of Bangkok, overlooking the junction of the borders of Thailand, Laos and Myanmar, formerly known as Burma. The Golden Triangle is a largely lawless region that last year produced more opium and heroin than Afghanistan and more synthetic stimulant pills than all the rest of the laboratories in Southeast Asia put together, drugs agencies say.

3) Western backpackers and busloads of other day-trippers pour daily into the picturesque Chiang Saen district, in Chiang Rai province, to buy souvenirs on the Mekong's banks. Some try illicit puffs on opium pipes in nearby villages. The museum, which will open officially early next year, aims to exploit this tourist business, luring the curious with the promise of entertainment and impressive audio-visual displays in English and Thai. But as visitors progress down the labyrinthine corridors that stretch across three floors, the warnings against narcotic abuse gradually become more powerful. "People think at first they know what they will see -- a quaint presentation about hill tribes growing opium. But that's only a small part of the story," said Mehl.

4) Mae Fah Luang has fought a 15-year battle against drug-taking and addiction in Chiang Rai province, establishing what the United Nations Office on Drugs and Crime (UNODC) says is probably the best anti-drugs crop-substitution program in Asia. Lessons from that program, which has succeeded in the nearby Thai mountains of Doi Tung in part by offering farmers of opium poppies a better income from alternative crops such as coffee and macadamia nuts, are built into the museum. But it also offers a thorough lesson in the history of opium, its derivatives such as heroin and laudanum, and explains how the drugs trade has helped change the world for hundreds of years.

Tragedy and Trauma

5) Thought to have been used first along the coast of the Mediterranean, archaeologists say the earliest evidence of opium was found in Switzerland dating from the Neolithic period. It was a popular sedative in ancient Egypt and Greece before spreading to northern Europe and Asia and becoming a key commodity that was exchanged for Chinese tea and other spices by the British and Dutch. With 360-degree special effects, the museum traces the 19th century opium wars between Britain and China before looking at prohibition in the 20th century and official efforts, often spectacularly unsuccessful, to stop the use of illegal drugs.

6) The museum asks visitors to themselves decide what could be the best approach to narcotics -- prohibition, drug eradication schemes, decriminalisation or legalisation -- but it pulls no punches on the tragedy and trauma inflicted by drugs on abusers. A final, heart-wrenching gallery recounts the powerful true stories of victims of drug abuse around the world through intimate video testimonies by their families.

7) "The feelings which develop through a visit to the museum change toward the very end when there is evidence of the death and suffering that drug abuse produces," said Antonio Maria Costa, executive director of the Vienna-based UNODC. "The end message is very strong, namely that use of drugs should be fought. Society has to use all its instruments, which means law enforcement for sure, but not only law enforcement. Prevention and treatment are equally important."

By guessing meaning from context, choose the answer that has the closest meaning to the word:

1. The word "disorientation" in paragraph 1 is closest in meaning to:

understanding



2. The word "distorted" in paragraph 1 is closest in meaning to:



3. The word "poppies" in paragraph 1 is closest in meaning to:



4. The word "contradiction" in paragraph 1 is closest in meaning to:



5. The word "exploited" in paragraph 1 is closest in meaning to:



6. The word "synthetic" in paragraph 2 is closest in meaning to:



7. The word "illicit" in paragraph 3 is closest in meaning to:



8. The word "curious" in paragraph 3 is closest in meaning to:



9. The word "narcotic" in paragraph 3 is closest in meaning to:



10. The word "addiction" in paragraph 4 is closest in meaning to:



11. The word "alternative" in paragraph 4 is closest in meaning to:



12. The word "prohibition" in paragraph 5 is closest in meaning to:



13. The word "eradication" in paragraph 6 is closest in meaning to:



14. The word "tragedy" in paragraph 6 is closest in meaning to:

choose one



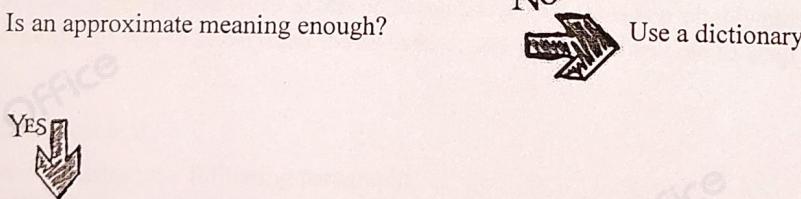
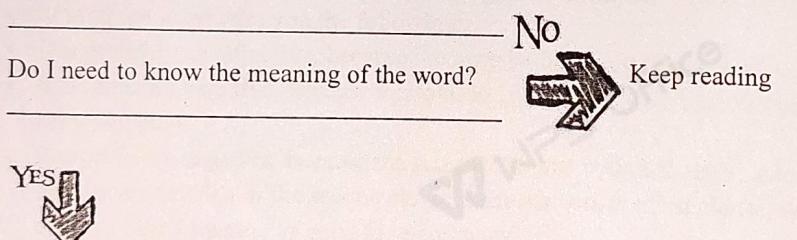
How to deal with unknown words

There are two questions to ask yourself whenever you meet an unfamiliar word. The first question is: 'Do I need to know the meaning of the word?' If not, you can keep reading and ignore the word. In order to answer this question, you need to make sure you have a clear purpose in your reading. The second question you need to ask is: 'Is an approximate meaning enough?' If not, you need to look the word up in a dictionary.

If the answer to both questions above is 'yes', it means you can guess what the word means then keep reading. Use the following to help you guess an approximate meaning:

- examine the immediate context of the word (i.e. the sentence in which it appears, and words which come before and after); pay particular attention to linking words;
- examine the wider context of the word (i.e. other sentences in the paragraph);
- look at the structure of the word (i.e. prefix, suffix, root).

The approach to unfamiliar words is summarised in the diagram below.



Use the following to help you guess the meaning:

Immediate context (other words in the sentences)

Wider context (other sentences in the paragraph)

Prefix, suffix, root

Using context

When you guess the meaning of a word from context, you need to consider first the *immediate* context, i.e. the other words in the sentence. If this is not enough, you need to use the *wider* context, i.e. sentences which come before and after the one which contains the word you are guessing.

Immediate context

Consider the following sentence:

Although the company's income from sales was higher than expected, its high costs in the form of salaries and other overheads put it in a disadvantageous position.

Imagine the word you want to guess in this sentence is 'disadvantageous' (it doesn't matter if you already know this word - this is just an example). The immediate context of the word tells you the following:

- it is probably an adjective, because it comes before a noun ('position')
- it is probably negative, because it relates to 'high costs', which are not usually good for a company
- it is probably negative, because the sentence begins with 'although', a contrast marker, so the idea in the second clause contrasts with the first clause, which is positive ('high income' is good for a company)

A good guess for the word at this point would be 'bad'. This is probably close enough for you to understand the main idea, and you would be able to keep reading.

Wider context

Now consider the following paragraph:

Although the company's income from sales was higher than expected, its high costs in the form of salaries and other overheads put it in a disadvantageous position. This was one of the main reasons why the company folded. This put all two hundred of its employees out of work.

Imagine the word you want to guess this time is 'folded' (this is a common word, but it has a special meaning in this sentence). The *immediate* context of the word does not tell you much: it is clearly a verb, but it is difficult to determine more than this using only the sentence it occurs in. To guess the meaning, you need to use the *wider* context, i.e. the sentences which come before and after. Using these, you can tell the following:

- it is probably negative, because it is the result of the company's 'disadvantageous (bad) position'
- it is something which can happen to companies
- it resulted in all of the company's employees being 'out of work'

From this, you can guess that the word means something like 'stopped' or 'stopped doing business' (because no one works there any more). In fact, 'to fold' in this context means '(of a company etc.) to close because it is not successful'.

Using prefix, suffix, root

Again consider the following sentence:

Although the company's income from sales was higher than expected, its high costs in the form of salaries and other overheads put it in a disadvantageous position.

Imagine (again) that the word you want to guess in this sentence is 'disadvantageous'. This word can be broken down into three components: *dis-*, which is the prefix; *advantage*, which is the root; and *-ous*, which is the suffix. You can get the following information by studying the word in this way:

- it is probably an adjective, because it ends in *-ous*, which is a common suffix for adjectives
- it is probably negative, because it begins with a negative prefix *dis-*
- its meaning is probably opposite to the root of the word, *advantage*

As before, a good guess for the word at this point would be 'bad'. Again, this would be close enough to allow you to understand the main idea and keep reading.

1. Product Description

A product description illustrates what the product is like, going into details about its features. A product can be anything- from a computer software program to a blow-dryer. Product descriptions are written for the people who want to use your product and get up to speed with it as quickly as possible. These descriptions can also include FAQs (frequently asked questions) regarding the product to help solve customer queries.

2. Process Description

A process description describes how a process works or an event is produced. These descriptions are written for people who want to learn the underlying mechanism of how something works. From photosynthesis to carbon emissions, process descriptions can be written for anything that needs explanation.

What is the Benefit Of Writing Technical Descriptions?

Well-written technical descriptions help your audience understand a particular product or process and empower them to use it without any difficulty.

No matter if your audience is your own employees, your target customer, external partners or clients, or someone else, the advantages of creating a technical description remain the same.

One thing to note is that these descriptions should be easy to read, comprehend, and most importantly, helpful. If the reader doesn't understand your product or process after reading your technical description, the document failed to do its job.

Therefore, it's important to write these descriptions in a simple, clear, and concise manner, getting rid of any jargon or buzzwords.

How to Write Technical Descriptions? (Step by Step)

Now that you know the importance of creating technical descriptions for both your employees and consumers, it's time to get into the details of actually writing a technical description.

While most technical descriptions can be dull to read, making them engaging, interactive, and enjoyable can make a good impression on your readers. Follow these simple steps to create an astounding technical description:

Step 1. Define your audience

The first and most critical step to writing a technical description is to define your audience. The more you know about the end-user of your technical description, the better you will be able to explain and predict their challenges. In turn, you will be able to write a technical description that is effective and in-line with what the reader presumes.

Step 2. Describe the result

Illustrate how the reader will benefit from understanding the technical description you have written and what will they accomplish after doing so.

When the reader knows precisely what to expect from the description, the buy-in goes up significantly. Moreover, defining the end-result before-hand will help you write the descriptions better, with your goal as your north-star.

Step 3. Gather Information

Next, you need to gather information for your technical description. Gathering answers to questions like:

What are the frequently asked questions by your consumers?

Where do most clients face issues?

Reading Skills

A reading skill or ability is, in simple terms, the ability for someone to interact with a text and take in the words. If you have the ability to read, you can do this.

What Is Reading?

Reading is the process of looking at written symbols and letters and understanding the meaning of them. It's one of the four main language skills alongside listening, speaking and writing. Reading is usually the third language skill that you learn in your language - it comes after listening and speaking.

When we read, we look at written symbols (letters, punctuation, spaces) and use our brains to convert them into words and sentences that have meaning to us. We can read silently (in our heads) or read aloud - speaking every word that we read.

To be able to read, we need to be able to:

- identify the words we see (word recognition);
- understand what they mean (comprehension);
- connect words and their meaning so that reading is automatic and accurate (fluency).

Different Types Of Reading Skills And Strategies

What Are Reading Skills?

Reading skills contribute to a child's reading ability - in other words, how well they can read and understand what they're reading. There's a wide variety of reading skills that children develop and work on throughout their primary education and beyond.

These skills can be placed into four main categories: decoding, fluency, vocabulary, and understanding sentences.

These main reading skills make up the bulk of a child's reading ability. Overall, they aim to arm children with the skills to be able to understand the meaning of what they read. This is not only essential for their English lessons and their other school subjects, but also for all areas of life beyond their education.

What Are Reading Strategies For Reading In The Classroom?

Reading strategies are teaching methods and activities that teachers and parents can use with their children to help develop language and reading skills. Strategies that improve decoding and reading comprehension skills benefit every student, but are essential for beginning readers, struggling readers, and English Language Learners.

There are many different reading strategies that you can apply to your reading sessions in the classroom. To improve reading comprehension, teachers can introduce the 7 cognitive reading strategies for effective readers. These focus on encouraging skills such as activating, inferring, monitoring-clarifying, questioning, summarising, and visualising. Read more about strategies of reading with Twinkl below.

Keep a sharp eye on visual clues: Does the book or text include any images that represent the text? Readers use the clues from the text to create a picture in their head. They use all their senses and imagination to create their mental image. Encourage your students to take a look at any visual clues in the text to see if they give you any clues that will help them to decode the text.

Sound it out: If your children are struggling with a particular word, break it down phonetically and say each sound separately out loud. This should help them piece together tricky words and understand how sounds interact. (Remember to look for diagraphs and trigraphs as you read.)

- i. Summarising: Summarising allows the reader to digest small snippets of information in a simple structure. This means that they're able to understand the basics of the text without needing to read it all. Using summaries as a reading strategy can help children identify key information and phrases in a text.
- ii. Ask questions: Readers should learn to ask and answer questions to clarify meaning and ensure they understand what they have read. To help this reading strategy, encourage children to ask questions before, during and after reading.
- iii. Make predictions: Readers use written and visual clues from the text as well as their own personal experiences to make predictions about what might happen before, during and after reading. Using this strategy in reading helps children become more confident in understanding key features of a story and piece together clues in writing.
- iv. Story Mapping: Story mapping is a great reading strategy that teachers and parents can use when working with fictional texts. This strategy uses templates such as this Story Mapping Boxes Worksheet to create a visual 'map' of the story plot, characters, setting and themes.
- v. Comprehension monitoring: Comprehension monitoring is a form of metacognition. This strategy involves the ability of readers to know when they understand what they read, when they do not understand, and to use appropriate strategies to improve their understanding when it is blocked.

8 Tips to Improve Reading Skill Easily

Here are some simple and effective tips and ways to help students build reading skills to better understand classroom curriculum.

1. Personalise reading materials: Students can increase their understanding by seeing how the material connects with their life. Have your students make personal connections with the text by writing it down on the page. You can also help students comprehend the text by helping them see an association with current events.
2. Problem-solving perfection: Blend real-world problem-solving skills into your curriculum. Have your students write out solutions to the problem and discuss their ideas as a class or in small groups.
3. Engage all five senses for different types of learner: Add in activities that reinforce learning and comprehension by using more senses as they read. Remind students to read with a pen or pencil to annotate the text. Have your students take turns reading out loud. Use projectors to guide your lesson and write down questions for those who are visual learners.
4. Set reading goals to motivate students: Have each student set their own reading goals. This can help them take action in building reading skills and students will be more mindful of how they are improving.
5. Try student led reading activities: Your students process reading material and curriculum in very different ways. As you implement reading activities to help your class learn complex materials, you will learn what works best for each student individually.
6. Revisit and reread confusing sentences and texts: Revisiting the parts that were confusing for your child (or that might simply need a quick refresher) can help your child gain a more complete picture of what he or she is learning. This also helps ensure your child is able to understand upcoming material in the text. You can also keep a record or list of words that your students are unfamiliar or struggling with. You can then encourage your child to look these words up in a dictionary to learn what they mean. Then, find ways to use them in a sentence that your child can write themselves.
7. Talk it out: When your child has finished reading, talk about what he or she just read together. Ask your child what he or she learned and his or her thoughts. For longer reading materials, like novels for book reports, make discussion questions you and your child can talk about together after each reading session.
8. Breakdown reading: Long, complex reading can be more digestible by breaking it up into pieces. Shorter segments will help students retain the information as the class discusses the materials. It can also help students build confidence in understanding a complex subject. When teaching how to improve reading in short bursts, why not check out our 60-second read packs that offer short and manageable reading materials to build reading skills. Our 60-Second reads to help your primary students practise their fluency and comprehension on a daily basis. With only 90-120 words and four short comprehension questions, this is the perfect way to dramatically improve English fluency.

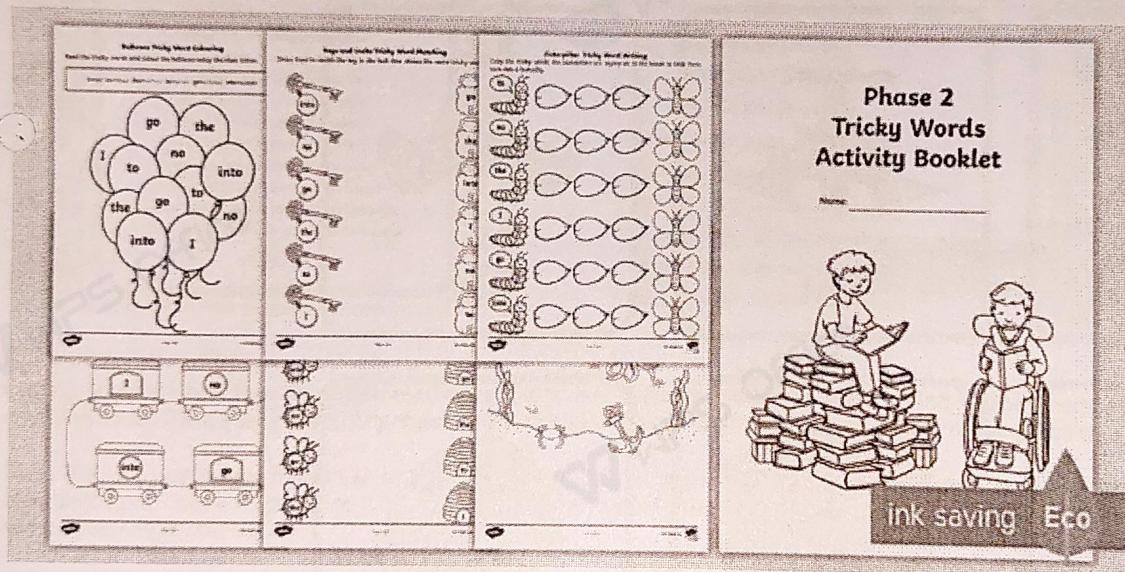
Types of Reading Skills to Improve

1. Decoding

This is a vital reading skill that acts as a foundation for other skills. It relies upon early language skills learned through the use of phonics. Children use decoding to sound out words that they may have encountered before but not read aloud.

Children also need to be able to connect individual sounds to letters, so that they can then piece them all together and sound out the full word.

Being exposed to rhymes, sounds and books at school and at home will help most children pick up phonological awareness. Some children may need further help through specific phonics lessons at school.



2. Fluency

Fluency is a useful skill that speeds up a child's reading and understanding of texts. It's also important for when they encounter irregular words, like 'of' and 'the', which can't be sounded out.

If a child is a fluent reader, they read smoothly and at a good pace without too many pauses. You'll find that they can group words together easily and use the correct tone when reading aloud.

Word recognition can be an obstacle when it comes to fluency. Children need to have seen a word a number of times before they remember how to say it - the number can be even bigger for a child with dyslexia.

To improve this skill you need to encourage children to practise their reading regularly. This means that they'll be exposed to more words more often.

This 60-Second Reads Bumper Pack is great for short bursts of text that aim to improve reading fluency at KS1.

3. Vocabulary

Children need to understand most of the words in a text to understand what they're reading. Key to this understanding is having a strong vocabulary, which in turn creates good reading comprehension.

They tend to learn vocabulary in many ways: from what they hear their friends and family say, or maybe what they hear on the television, internet or radio.

A child's vocabulary can be increased easily by exposing them to more words. This should be a conscious effort by the adults in the child's life by having conversations about lots of different age-appropriate topics.

When a child reads along with an adult or older sibling it can be useful to stop at more difficult or new words and explain what they mean to create some context that the child can refer back to.

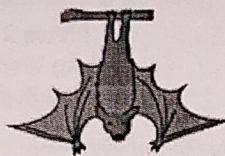
Another good idea is for the adult to read the text beforehand and note down any words that the child might struggle with. Then, you can practise this vocabulary before reading the text.

Keeping a vocabulary log of new words and their meanings is a fantastic way for children to track how many words they've learnt. This would be a great tool to refer back to as well.

Word games and flashcards are especially useful to use in class and there are lots of different options and themes for KS1.



cat



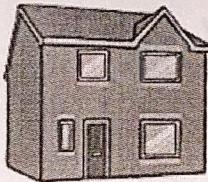
bat



hat



mouse



house



dog

4. Understanding Sentences

Learning about how sentences are formed isn't just useful for writing. Knowing how an idea links with another within sentences helps with reading as well. Being able to connect the sentences together easily to understand their meaning increases reading fluency. This skill is called cohesion and it can help with coherence further down the line. (Coherence is the ability to connect ideas to other ideas across a large piece of writing).

5. Using Background Knowledge and Reasoning

Having background knowledge and knowing the context of things can greatly help with a child's reading ability. It allows them to read between the lines, make inferences and draw meanings from texts, even when the meaning isn't literally spelt out for them.

For example, when reading Oliver Twist, it's helpful to know what the world was like when Dickens was writing the novel. Learning about the Victorian era can help us to understand the context on a deeper level, which means we can understand more about the plot and the characters. It also allows us to see what message Dickens was trying to convey during this time.

Building up a child's background knowledge can be done in a variety of ways. They can learn through life experience, what they see on TV, or they can do research into specific topics.

Having this knowledge is just the first step to developing a child's reading ability though. They then have to learn how to use this knowledge to their advantage, so that they can get more out of what they read. You can support children with this by asking them inferential questions about what they've read.

Examples of Inferential Questions

Texts Clues + Background Knowledge = Inference

Why...

- Why do you think...
- What is the problem?
- Why did the character...
- What can you conclude about...
- What is most likely true about...
- Predict what would happen if...
- Predict what will happen when...
- What lesson does this text teach?
- How does the author feel about...
- How did the character feel when...
- What generalisation can you make?
- What lesson did the character learn?
- From this story, you could probably guess...
- What would happen in a sequel to this story?

ink saving Eco

5. Paying Attention

Paying attention and focusing when reading is a key skill. If you're reading, but your mind is elsewhere, you won't take in anything at all. That's why it's an important skill for children to learn when developing their reading ability.

Plus, if a child pays attention to what they're reading, they're much more likely to remember what it is that they've learnt from that text. They'll also realise if they don't understand what they've read and that they need to go back and reread the text to fully understand it.

Getting a child to pay attention while they're reading is easier said than done, however. The key is finding reading material that they're truly interested in and fascinated by.

Reading Strategies

Flippy Dog

Flip the vowel from

Chunky Monkey

Look for ch

Don't Forget

Use your memory where have you seen this before

Sharp Eye

Look at the pictures

ink saving Eco

How Can You Improve Reading Skills At Home?

The best way to boost a child's reading skills is to read, read and read some more! Reading practice means children will encounter more words, practise pronunciation and develop their fluency. This does wonders for a child's reading ability.

However, getting a child to read in the first place can be a difficult task. Here are some tips to help you:

- ▶ Find out what your child loves to read. They'll be much more willing to practise if they're interested in what they're reading about. 41% of parents say that their children do not enjoy reading. That's a lot of kids! And when kids don't like reading, they are less likely to put the time in to improve. This leads to a cycle of poor reading skills, lowered comprehension, more frustration and even less love for reading.
- ▶ Mix things up. Read short stories, poetry, or even newspaper articles. There's so much vocabulary to discover.
- ▶ Get into a routine. Reading regularly is essential, so find a time to read and stick to it. This could be every day, every few days or every week.
- ▶ Create a positive environment. Reward your child when they do well and encourage them when they need more support.

What is Transcoding ?

(Data Visualization)

Transcoding is the process of converting (decoding or encoding) the data from one form to the other form.

Eg. Raw data into visual form or vice versa

- Why is it required ?
- The best way to convey info. is visuals not descriptions
- Communicates quickly and effectively
- Maximum data in minimum space
- Interpretation and analysis become easy
- Both can concentrate easily
- Simplifies complex into easy
- More appealing and attractive to the senses

GRAPHIC AIDS AND PURPOSE

Purpose / Functions	Graphic Aids
To organise numerical data/ to show quantitative data and related info	Table
To show comparative and contrastive data	Bar charts/ Diagrams
To show trends	Line graphs
To show a process or steps /instructions	Flow Chart
To show info in percentage / proportions	Pie Chart
To present data about a geographical region	Maps
To show how something is organised	Organogram

Table - Exercise

Human Development Index and components, 2010 and 2013

Human development group or region	Human Development Index value		Life expectancy at birth (years)		Mean years of schooling (years)		Expected years of schooling (years)		Gross national income per capita (2011 PPP \$)	
	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013
Very high human development	0.885	0.890	79.7	80.2	11.7	11.7	16.2	16.3	38,548	40,046
High human development	0.723	0.735	73.9	74.5	8.1	8.1	13.1	13.4	11,584	13,231
Medium human development	0.601	0.614	67.1	67.9	5.5	5.5	11.3	11.7	5,368	5,960
Low human development	0.479	0.493	58.2	59.4	4.1	4.2	8.7	9.0	2,631	2,904
Arab States	0.675	0.682	69.7	70.2	6.2	6.3	11.7	11.8	15,281	15,817
East Asia and the Pacific	0.688	0.703	73.5	74.0	7.4	7.4	12.3	12.5	8,628	10,499
Europe and Central Asia	0.726	0.738	70.7	71.3	9.6	9.7	13.3	13.6	11,280	12,415
Latin America and the Caribbean	0.734	0.740	74.2	74.9	7.9	7.9	13.8	13.7	12,926	13,767
South Asia	0.573	0.588	66.4	67.2	4.7	4.7	10.6	11.2	4,732	5,195
Sub-Saharan Africa	0.468	0.502	55.2	56.8	4.8	4.8	9.4	9.7	2,935	3,152
World	0.693	0.702	70.3	70.8	7.7	7.7	11.9	12.2	12,808	13,723

PPP is purchase power parity

Source: Human Development Report Office calculations.

(Source: Human Development Report, 2014)

Table - Answer

➤ **Which part of the world has the highest life expectancy at birth?**

The data given under the second column of the table indicates that Latin America and the Caribbean region possess the highest life expectancy at birth during the period between 2010 and 2013. During this interval, the life expectancy at birth for this region increased marginally from 74.2 to 74.9 years.

➤ **On an average, how many years of schooling does a child from South Asia get?**

The third column of the table shows that a child from South Asia gets about 4.7 years of schooling on average. This figure is the lowest for any region represented in the graph.

➤ **Which part of the world shows the greatest increase in human development between 2010 and 2013?**

The greatest gain in the Human Development Index score between 2010 and 2013 has been attained by Sub-Saharan Africa. This region has seen an increase of 0.034 index points during this time.

➤ **Compare the Human Development Index value of South Asia with that of Europe and Central Asia. Which region has shown more progress in recent years?**

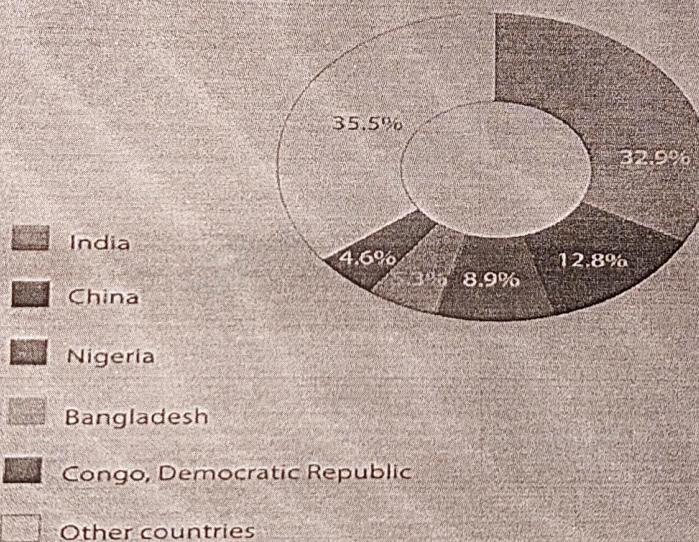
The table indicates that during the time period between 2010 and 2013, South Asia has seen an increase of 0.015 index points in human development. Europe and Central Asia, on the other hand, has seen an increase of 0.012 index points. Hence, it can be deduced that South Asia has shown more progress than Europe and Central Asia between 2010 and 2013.

➤ **Which region has the lowest life expectancy at birth?**

The second column of the table shows Sub-Saharan Africa to have the lowest life expectancy at birth during 2010 to 2013. During this time period, the life expectancy at birth for this region increased only by 1.4 years.

Pie Chart - Top Five nations with extreme poverty

Top five countries with the largest share of the global extreme poor, 2010 (Percentage)



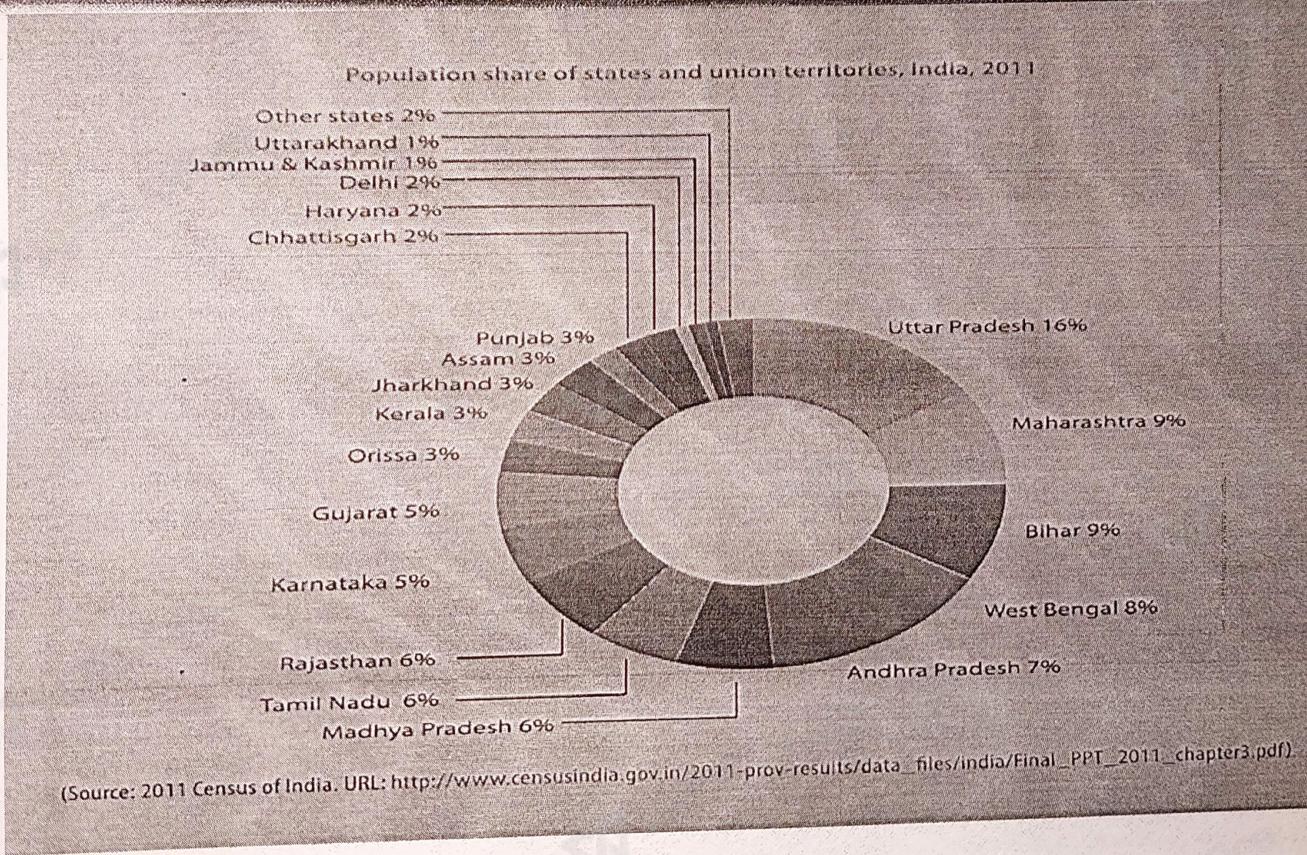
(Source: The United Nations Millennium Development Goals Report 2014. URL: http://www.un.org/millenniumgoals/2014_MDG_report/MDG_2014_English_web.pdf)

Points to be noted

- When describing the diagrams degrees comparison is of much use.
- Use the sequencers and linkers (connecting words) as and when required
- Eg. In the beginning, initially, first of all, firstly, then, next, beforehand, previously, earlier, on the other hand, at the same time, simultaneously, later, following this, eventually, subsequently, finally, lastly.

Pie Chart - Exercise

Population share of states and Union Territories,
India ,2011.



Pie Chart Description

The above chart is taken from the annual report of the United Nations Millennium Development Goals published in 2014. As the title of the graphic explains, it represents the percentage of extremely poor people living in the five most poverty-stricken countries in the world.

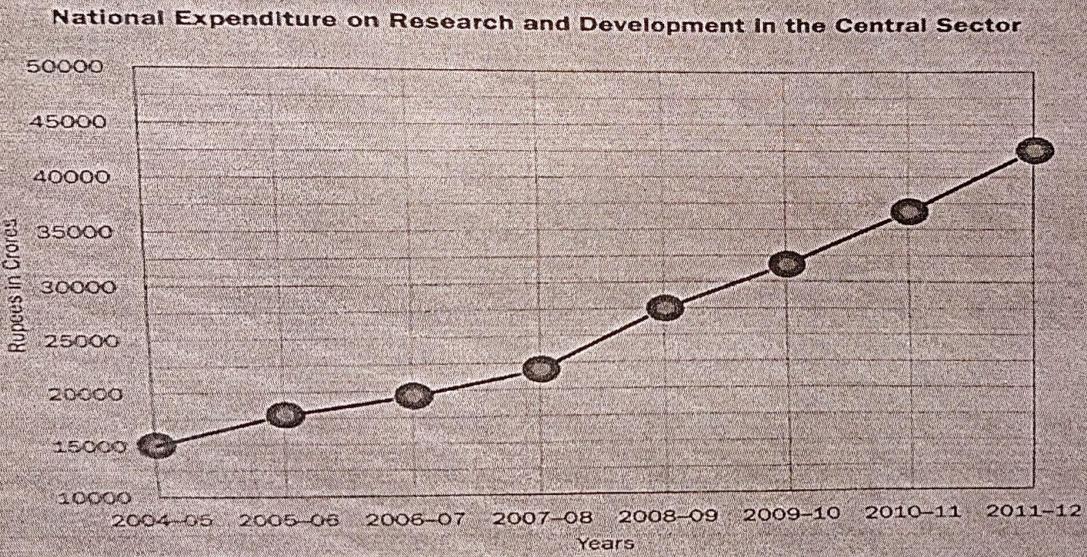
This graphic uses a pie chart to visually represent the data. A pie chart is useful because it can visually represent the proportion of each type of data when compared to the whole. It is called a pie chart because it resembles a pie that has been cut into pieces. The graphic above uses a particular type of pie chart called a doughnut chart where the central portion of the graphic has been left blank.

On each 'slice' of the chart, the numerical percentage it represents has been printed. For instance, the 'slice' in the light blue colour represents India, which is 32.9% of the whole. Below the chart, a key or legend is given which links each colour in the chart to a particular country.

On reading this graphic, you will notice that almost one-third of the poorest people in the world live in India. China, despite its economic progress, is home to the second largest population of poor people. The three Asian countries represented on the graphic (India, China and Bangladesh) together account for more than half (51%) of the world's poor people. Another fact illustrated by the graphic is that although populous countries like India and China have large populations of poor people, it is often the less populous countries, like Nigeria and Congo, which account for a disproportionately large percentage of the global poor.

Graph 1

This graph shows the increase in expenditure of the central government on research and development from 2004–2005 to 2011–2012. Study the graph carefully. Fill the gaps in the paragraph using suitable words and phrases from the box.



Graph 1- Exercise and Answer

significant increase

a sharp increase

sharply increased

a steady increase

similar trend

the most significant increase

From 2004–2008, there was (1) _____ in the expenditure by about 2000 crores every year.

Therefore, the expenditure increased from 15,000 crores in 2004 to 21,000 crores in 2008. However, in 2009, there was (2) _____ in the expenditure to about 27,000 crores. A (3) _____ can also be observed in the year 2012, when the expenditure again (4) _____ by 6000 crores.

To sum up, it can be seen from the graph that with every passing year, there is a (5) _____ in the expenditure on research and development in the central sector, (6) _____ being in the years 2009 and 2012.

Graph 2

Task 3

This graph shows the sector-wise expenditure incurred on research and development in education. Study the graph and say whether the following statements are true or false.

National Expenditure on Research and Development by Sector



Graph 2 Answer

1. The national expenditure on research and development **gradually grew** from 2004 to 2012 in all the five sectors. **True/False**
2. There is a **marginal difference** in the increase in national expenditure between the Higher Education Sector and the State Sector. **True/False**
3. The expenditure by the Central Sector **remained stable** as compared to the other sectors. **True/False**
4. In the year 2008, the total expenditure on research and development **Increased significantly**, as compared to the other years. This happened because there was a **significant increase** in the expenditure incurred by the Higher Education sector. **True/False**
5. The total expenditure on research and development by all the sectors **steadily increased** from about 24,000 crores in 2004, to around 75,000 crores in 2012. **True/False**