

# Humanising Science with Stories

Veena Prasad

A teacher has to deal with a variety of personalities at the same time in the classroom. A science classroom, in particular, presents its own unique challenges. Some children are already inclined towards science and are eager to lap up all the knowledge the curriculum has to offer; some are more inclined to the humanities and may easily get bored with an overdose of facts and figures; some may be eager to learn, but find that their attention easily wanders; and a few others may have already learnt the concept and facts and are just bored.

As a science writer, I have found that using stories to explain the idea behind a scientific concept, as well as the history of how scientists figured it out makes for a far better experience – both for the writer as well as the reader, and by extension, for the teacher as well as student. Take for example the discovery of phosphorus. A science textbook would typically have some facts around it – its atomic number, when it was discovered and by whom, and its major uses and reactions. But consider the story of how it was discovered.

An alchemist named Hennig Brand, in his quest for the ‘philosopher’s stone’ was trying desperately to create gold in his laboratory. After failing many times, he got the bizarre idea that if he kept boiling urine, it might turn into gold. (Was it because of the colour, I wonder). He kept several pots of urine on the boil for a long time, until he managed to evaporate all the liquid and isolate a waxy substance that spontaneously caught fire when exposed to air. This was the element phosphorus (this word means ‘light-bringing’ in Greek), and Hennig Brand became the first person to discover an element.

This is a story I like for several reasons. One, it is a great way of grabbing the attention of children before moving on to the concept of an element. They are already curious to know. They are brimming with questions: *What is an element? How does one discover it? How do scientists know the techniques to isolate them? Were these techniques devised with the purpose of isolating a specific element? Did the isolated element find purpose after being*

*discovered?* (Phosphorus was the key ingredient in the invention of the safety match).

Another reason is that the scientist, or ‘discoverer’, becomes humanised. Here was a person who had an idea to achieve some objective, gave it thought and charted out a course, set up a laboratory to convert his thoughts into action, experimented, examined the results, experimented some more, changing course if the results demanded it, and finally ended up with something entirely different from his original goal. This is the essence of science – you experiment, note the results, and follow the path that the result takes you. You may encounter unexpected outcomes and your initial assumptions may all be proved wrong, but you continue anyway, guided by a combination of facts and intuition, driven by a dogged determination to figure out that problem you were trying to solve.

By humanising scientists, we make their work relatable to the students. Students are able to grasp the concept in a holistic manner, compared to a bland ingestion of facts. They may even be motivated to become scientists! At the very least, they will laugh at the ‘toilet humour’ in the urine experiment which, by the way, is a historical fact.

This brings me to a different type of science story – one that does not have any historical documentation. These are related to discoveries that were made so long ago that no one knows exactly how they occurred. Fire, wheel, pottery, weaving, and so on fall under this category.<sup>i</sup>

## **Fictionalised history**

As a storyteller, I can take advantage of the lack of documentation for ancient innovations and fictionalise the entire path leading to the discovery. I can take the liberty of creating my own characters, putting dialogue in their mouths, making them interact with their world in interesting ways that finally lead to the breakthrough.

However, I am also mindful of the fact that scientists have put forward hypotheses on how these discoveries might have been made. These

hypotheses can be the basis for our story.

For example, it was most likely a fire caused by lightning that captivated early humans and made them want to explore and harness this energy. Teachers can encourage their students to imagine themselves as cave-dwellers who first encountered fire. *How would they react? Would they be frightened? Excited? How would they approach a burning ember in the forest? Would they touch it? Would they understand it might burn them? When did they realise that animals were scared of fire, and it could be used to keep them safe? And having realised this, how did they try to capture fire, and keep it burning safely? Was there a process of trial and error?* From here, teachers can introduce the ‘fire triangle’ – oxygen, fuel and a spark – the three components required to start a fire and keep it burning. Take away one of these and the fire is gone.

It can be noted here that traditional teaching usually starts with the fire triangle and there is a chance that students may end up memorising it without fully grasping the awe, the momentousness of this discovery that is so uniquely human in its ingenuity.

### Power of the narrative

You may have noticed that there are two ways in which the story idea has been treated in each of the examples discussed. In the first example, the story behind the discovery of phosphorus has been narrated to the students, whereas in the second, children are encouraged to imagine the scenario of humanity’s first encounter with fire and make up their own stories. Both serve the purpose of opening up the minds of students and stirring their curiosity. The impact comes from the way the narrative is built.

The two key elements of a narrative are, *setting* and *characterisation*. Setting refers to the location where the story takes place. In the story about phosphorus, the laboratory is the setting. Characterisation refers to the people playing a part in the story, their motivations, and personalities. Hennig Brand, for example, is a character who can be portrayed as comical but determined. In the story of the discovery of fire, the human who first tries to touch fire can be portrayed as brave, and the one who learns from that experience is wise.

A visit to the beach can make a good setting for a story to introduce the concept of ocean tides. A group of observant children playing on the beach

are the characters in the story. As the sun is about to go down, the children notice that the waves are coming further up the shore, covering areas that were previously dry. Their parents are telling them to move back and play safely. They can venture out again the next morning when the sea falls back. *Why are the waves reaching further inland? And why do they recede after a few hours?*

The same beach setting could be used in a Chemistry class to explain how salt is made from seawater. You could revisit it in the Physics class to talk about altitude and sea level, and again in Biology class to introduce marine crustaceans. The narrative can have the constant refrain of observations made by the children and information or warnings provided by adults, and they start wondering. By creating a familiar visual and drawing their attention to a familiar occurrence, we pique their curiosity. We set their thoughts going along the lines of – ‘There is a *reason* for this occurrence. There is a *science* behind this.’

The teacher can then take the momentum forward by launching into the explanation of the science concept. Chapter completed!

Keeping the story narrative going throughout the year can have an additional benefit – every time the class gets bored or distracted, the teacher can invoke this story, perhaps in a different setting, and pull the children back into engagement mode.

### The storytelling formula

Below are a few storytelling techniques that will help teachers quickly come up with stories. Additionally, some resources are given at the end of this article which can also be used to source stories.

1. You would need a main character (the protagonist) and optionally, a few supporting characters (limit this to two).
2. Define a beginning, middle and end for your story.
  - a. The *beginning* would deal with either of the following:
    - i. A problem faced by the protagonist
    - ii. A strange natural phenomenon witnessed by the protagonist and which he/she starts wondering about
  - b. The *middle* could be about either:
    - i. The protagonist trying to solve the problem
    - ii. The protagonist thinking about explanations for the strange phenomenon;

can also include experimentation and evolving thought

- c. The *end* might be about finding a solution – this can either be for the original problem or something totally different, but new and exciting anyway.

Of course, it is not practical to tell stories before introducing every single concept that we need to teach. It is necessary to strike a balance. We can perhaps tell a story to introduce an important chapter in the textbook, and once we have the attention of the children, take this momentum forward to the next concept. A few

classes later, we can introduce another story to reinvigorate the class. We can even use the same story with slightly different narratives to suit a variety of concepts.

To summarise, a storytelling approach to teaching science benefits in the following ways:

- Helps retention and recall
- Helps students to connect facts more meaningfully
- Bridges the gap between theory and reality
- Captures imagination and fosters original thinking
- Maybe ignites the spark in a future scientist!

#### Recommended reading

*A Brief History of Nearly Everything* by Bill Bryson

*The Story of Science* series by Joy Hakim

*The Disappearing Spoon* by Sam Kean

*Teaching Science With Stories*. UTA Online.

<https://academicpartnerships.uta.edu/articles/education/teaching-science-with-stories.aspx>

*The Story Behind the Science*. How Science Works.

<https://www.storybehindthescience.org/how-science-works>

#### Endnotes

- i These have been explored in *The Spark That Changed Everything* by the author.



**Veena Prasad** is the Director of Content and Communications at CrowdANALYTIX. Primarily a STEM author, she has dabbled in fiction, biographies and even the occasional song lyric. She enjoys tackling complex subjects and writing about them in simple and lucid prose. Her book, *The Spark That Changed Everything* combines fact and fiction to bring science and history alive. Veena holds a bachelor's degree in Computer Science Engineering and a master's in English Literature. She may be reached at [veena.rp@gmail.com](mailto:veena.rp@gmail.com)