



Children's literature in the science and technology classroom

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Direction de la formation générale
des jeunes
Ministère de l'Éducation



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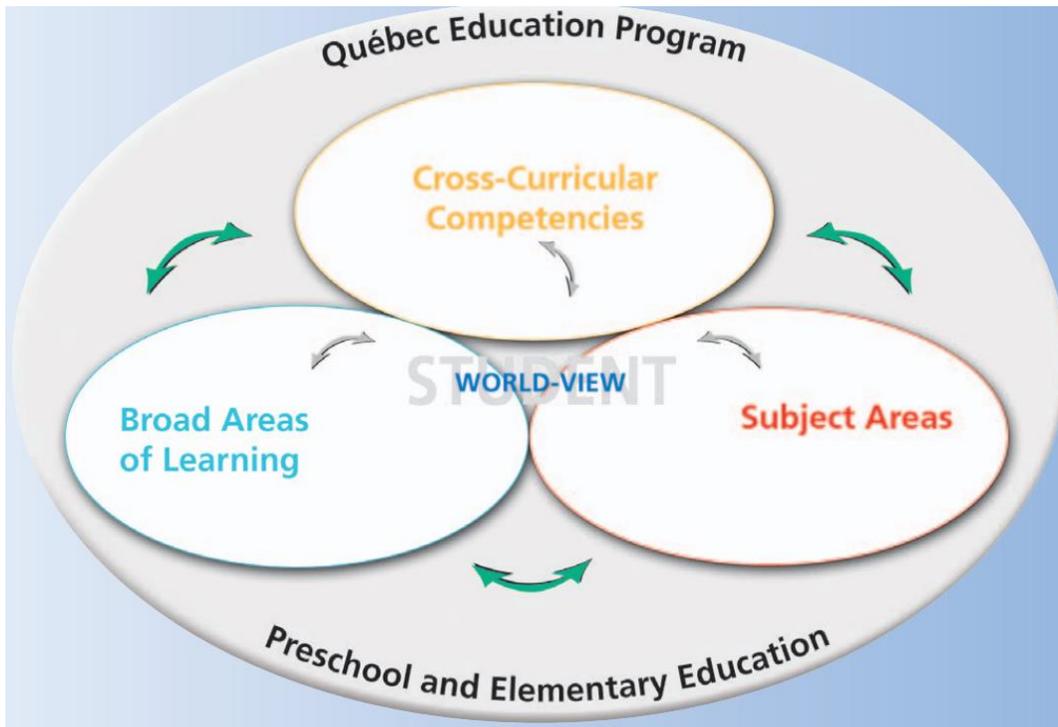
Objective of the presentation

- ◇ To provide guidelines for introducing and using children's literature in the elementary-level science classroom



Québec Education Program and interdisciplinarity

The school is required to transcend the boundaries between subjects in order to help students perceive the connections between their various learnings. (QEP, 2001, p. 5)

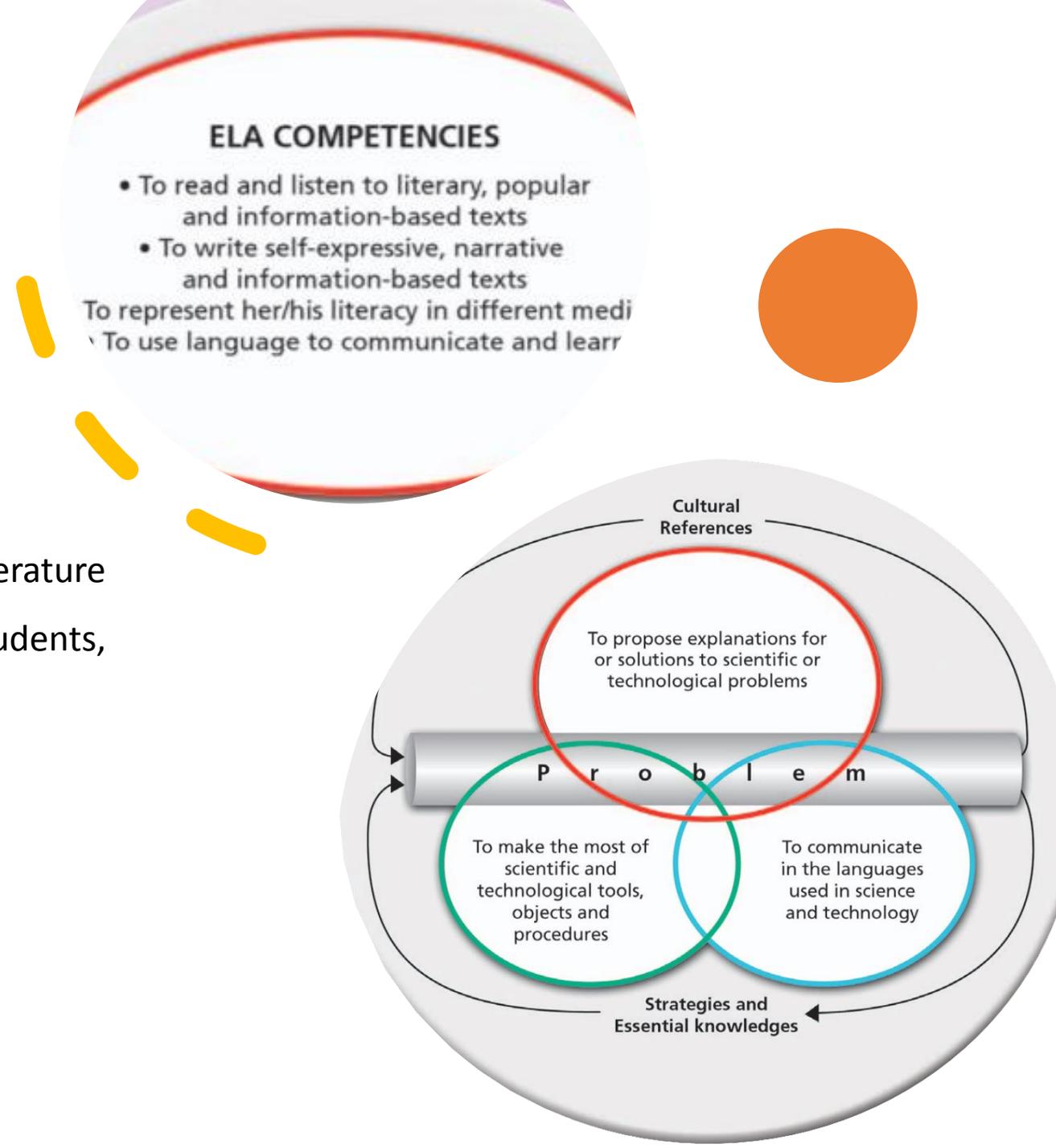


The Languages subject area suggests that teachers take advantage of reading opportunities to build knowledge in other subjects, especially in science and technology.

The science and technology program encourages students, especially those in Cycle One, to learn about scientific and technological activity through other subjects and the broad areas of learning. (QEP, 2001, p. 160)

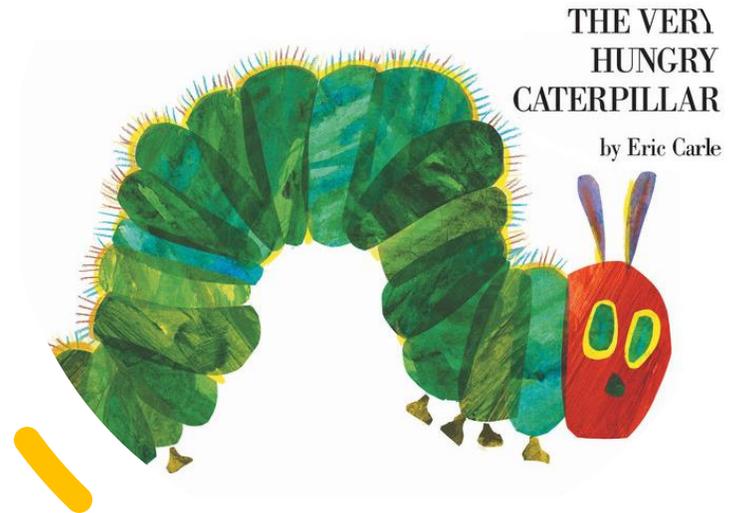
Bridging science and children's literature

Building a bridge between science and children's literature fosters the development of science-related skills in students, while contributing to their engagement in reading.



Children's literature

Children's literature is defined as any material written for children from early childhood to adolescence. This includes non-fiction, picture books, fairy tales, comic books, novels, fables . . .





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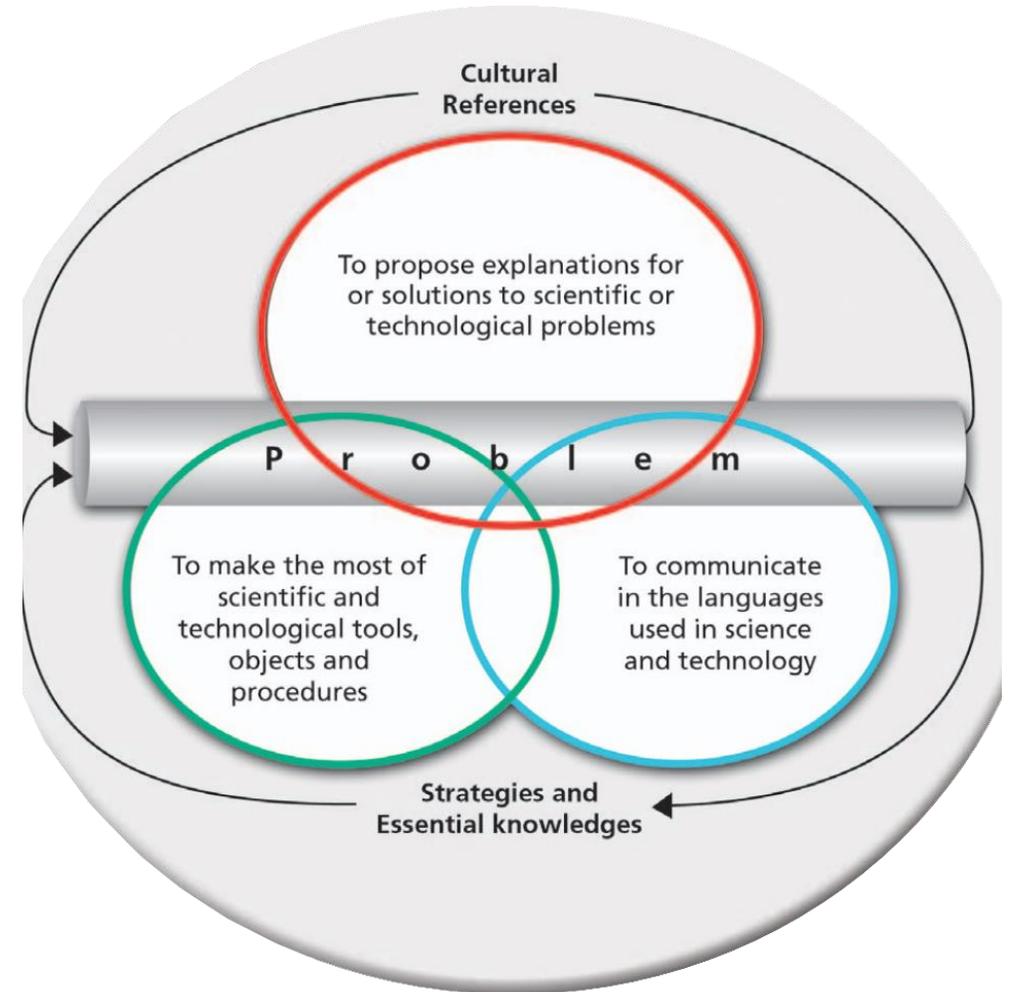


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Science and technology program An introduction to scientific activity

Introducing students to scientific activity means focusing on questioning, the experimental dimension and the capacity for argumentation and reasoning associated with the subject of science and technology. Learning goes beyond the assimilation of content and information.

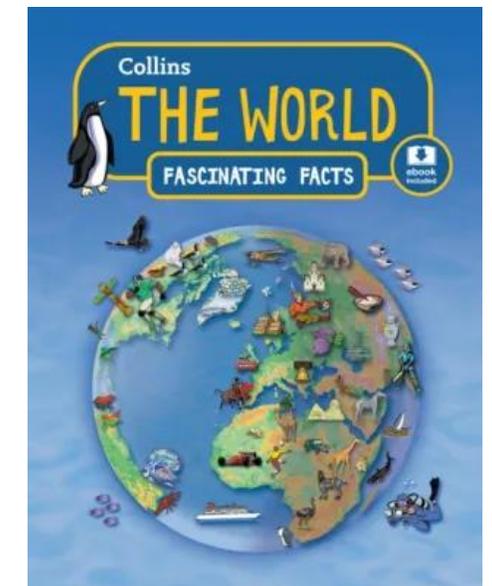
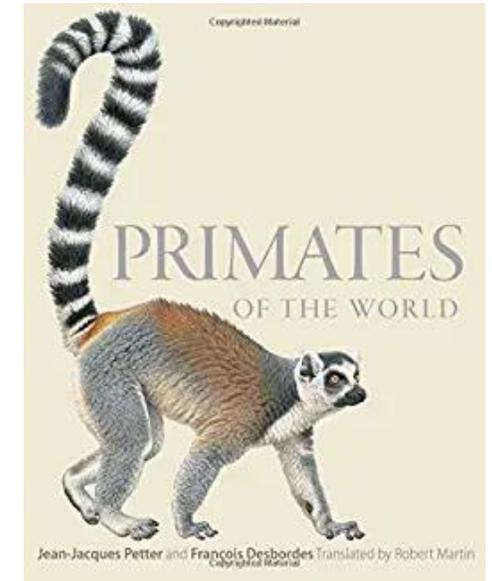
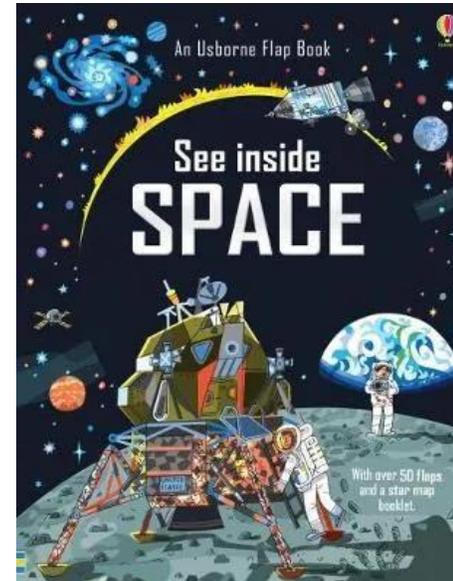
In this context, how can we use children's literature to introduce students to scientific activities?



Non-fiction

Non-fiction books use information-based texts. They address a specific topic and seek to educate.

- Introduce students to the structure of non-fiction books and allow them to become familiar with reading information-based texts.
- Stimulate curiosity by presenting works of non-fiction that are accessible to students.



Other non-fiction books

Non-fiction picture books can serve as reference tools for young readers.

A watercolor illustration of a small, orange mouse-like creature with large whiskers, wearing a green jacket and brown pants. The creature is standing on a thin, horizontal beam of light that extends across the width of the page. The background is a textured, light brown paper.

On a BEAM of Light

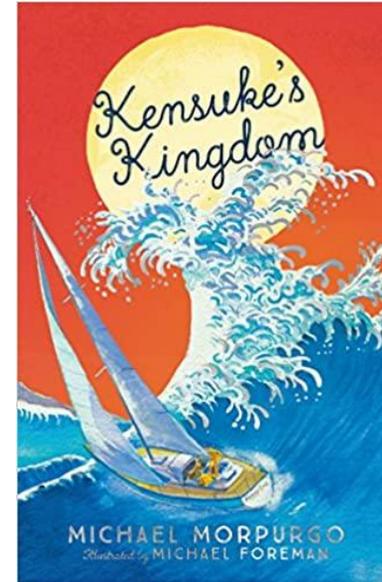
A Story of Albert Einstein by Jennifer Berne pictures by Vladimir Radunsky

On a Beam of Light: A Story of Albert Einstein. Jennifer Berne, 2016.

Non-fiction books

Supporting students' understanding and interpretation of literary works

When students make connections between a literary text and various information-based documents, reading becomes a source of enjoyment as well as of knowledge.

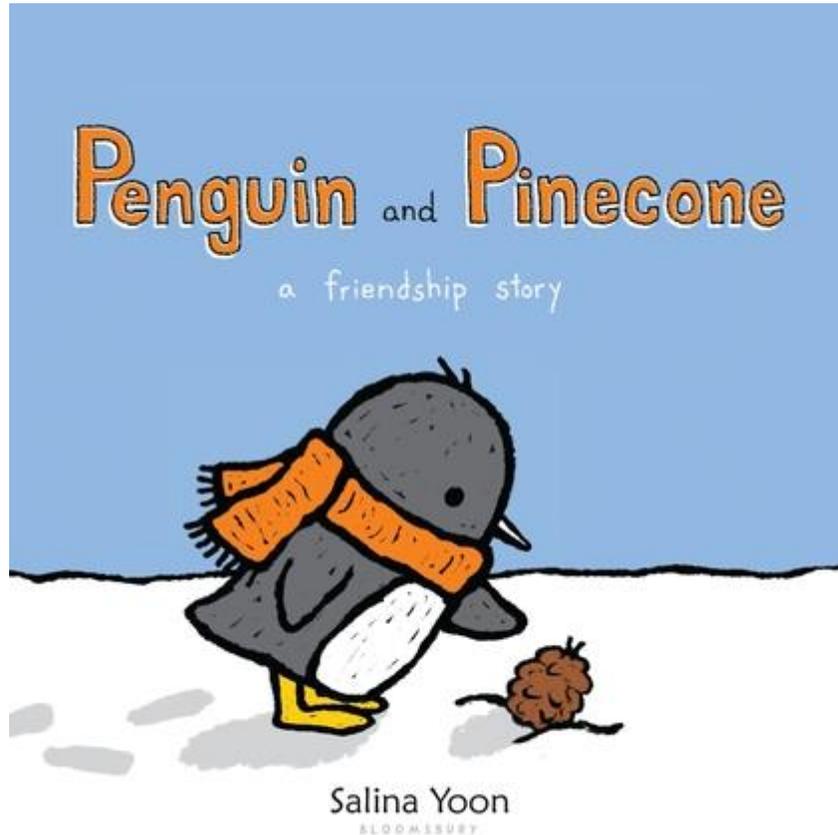


Kensuke's Kingdom. Michael Morpurgo, 2005

While sailing around the world with his parents, Michael falls into the sea. When he regains consciousness, he is with his dog on a remote island in the middle of the Pacific! How will he survive without food and shelter? This is the beginning of an adventure that the young boy will never forget . . . [Translation]

After reading each chapter, students are invited to read information-based texts on related content, such as orangutans, sailing techniques and the islands of the Pacific Ocean, to better understand and interpret the book.

Literary appreciation and environmental education and sustainable development



Take advantage of the thought-provoking nature of certain literary works to get students to reflect on their relationship with the world.

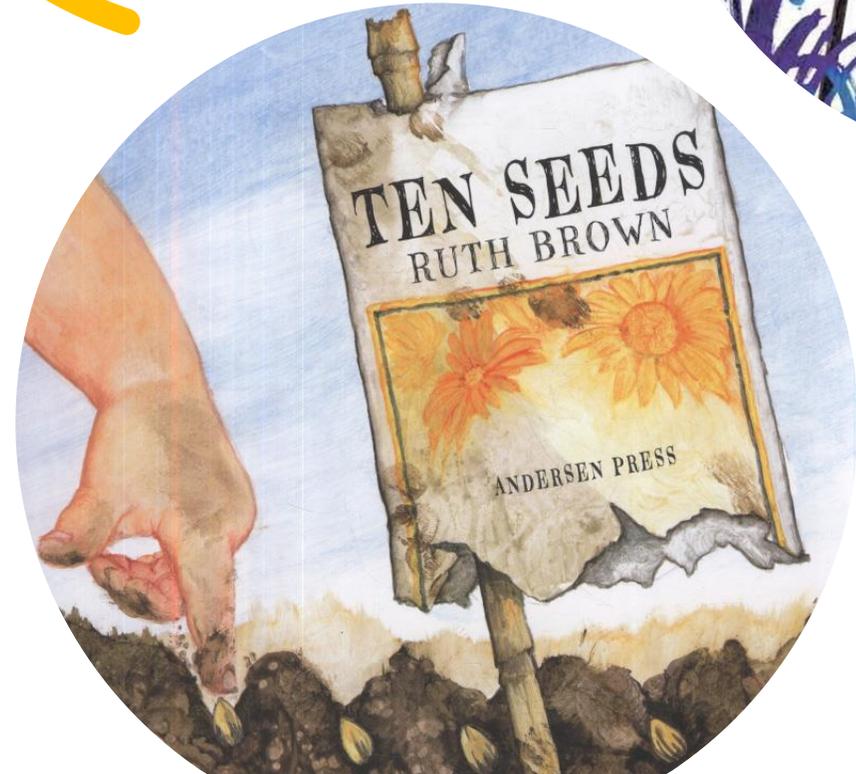
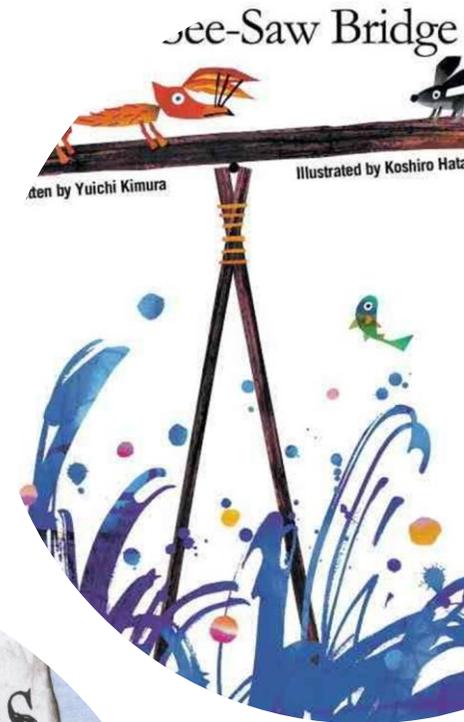
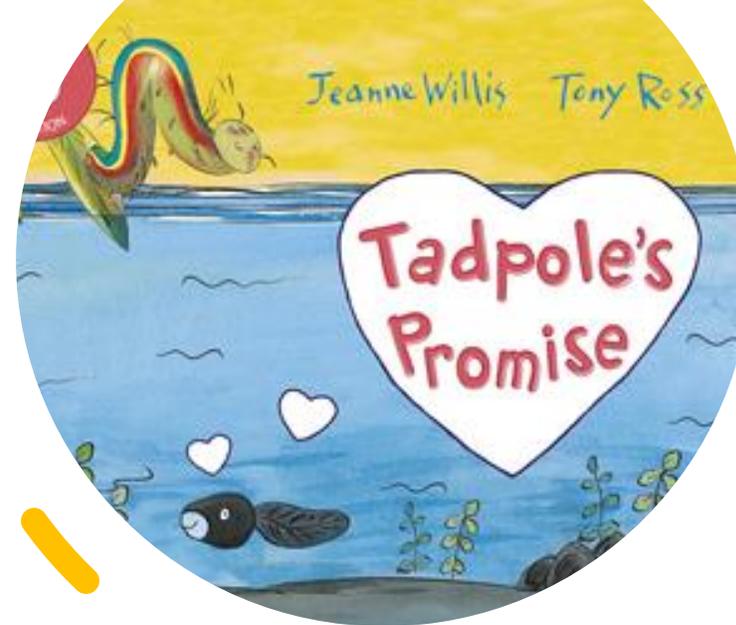
When reading picture books, invite the students to identify with the character in order to create a strong emotional link with the living world. Have them research the special needs of penguins and pine cones, and compare their respective living environments. Make them aware of the fact that living beings have particular needs and can only live in a specific natural environment.

Realistic fiction picture books

Realistic fiction picture books meet the usual standards of fictional narrative (anthropomorphized animals, imaginary world, etc.) but are based on reality and the laws of nature.

As these picture books contain scientific knowledge, they become a tool to lead the students to ask questions, to observe, and to imagine experiments to build the scientific knowledge dealt with in the story.

(Bruguière and Triquet, 2012)

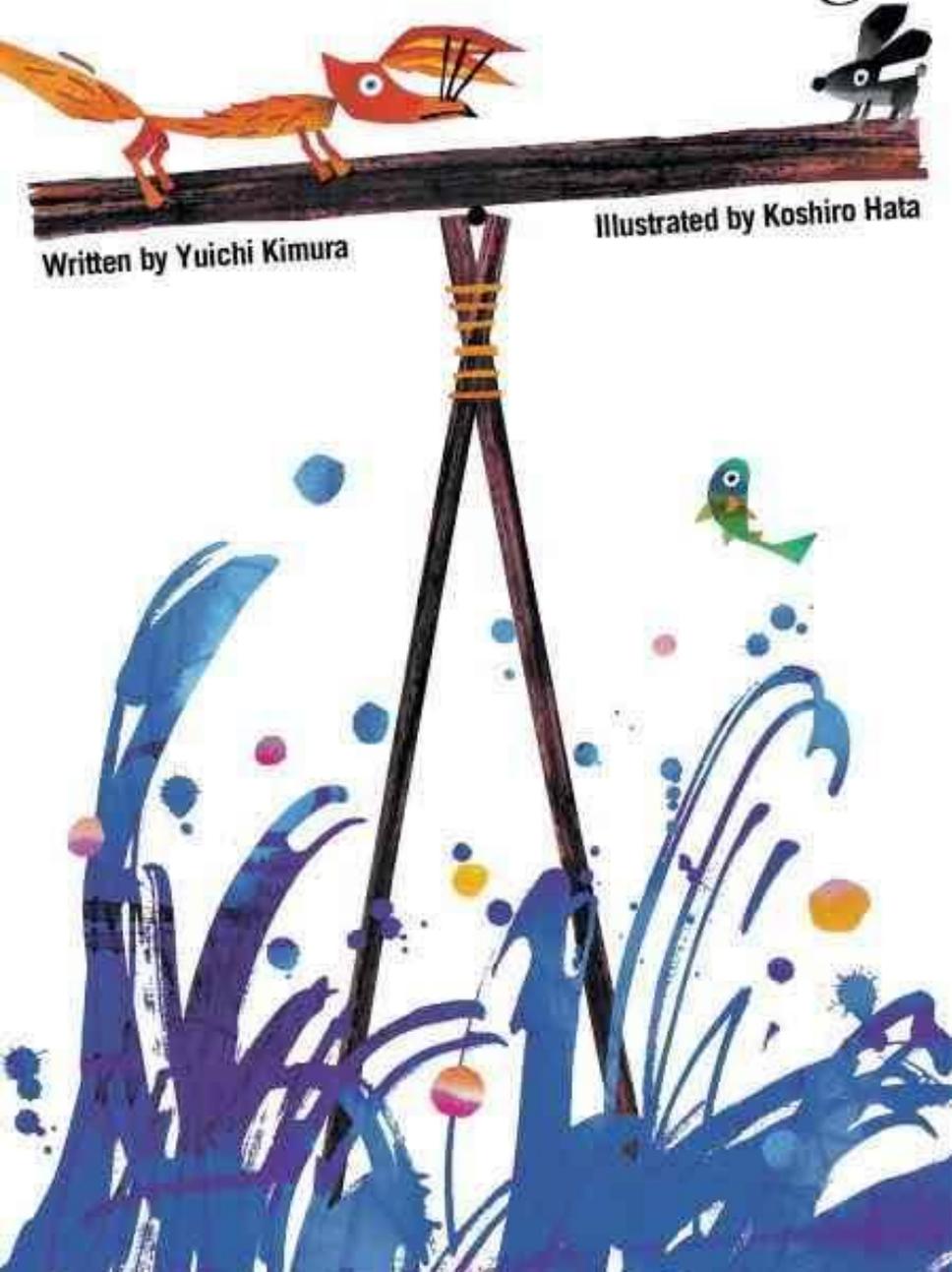


Similarities between the narrative arc and the investigation process (Triquet, 2007)

The link between plot and conflict can be used in the creation of teaching/learning sequences.

Narrative arc	Quest for solutions to a scientific problem
Catalyst for the story	Scientific problem
Resolving the conflict through actions or events	Seeking solutions

On the See-Saw Bridge

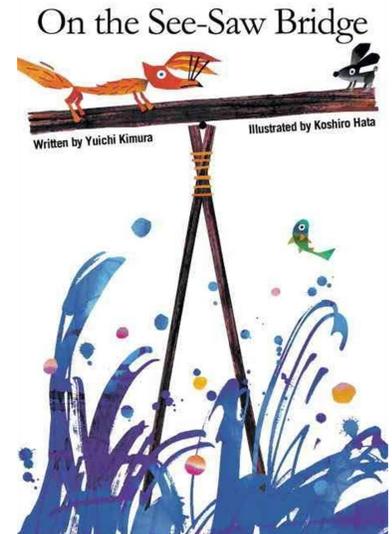


Proposal for a teaching sequence for students aged 9 to 12¹ with the picture book *On the See-Saw Bridge* (Kimura, 2005)

“This is the story of a fox chasing a rabbit. Their chase brings them to a bridge. The rabbit gets to the other end of the board, but it cannot go any further because the bridge has suddenly become a see-saw. The fox approaches the rabbit but suddenly turns back, obeying the rabbit's cry of "STOP!" The two enemies are forced to cooperate to stay alive. In the morning, when the wind picks up, the board starts to spin. In a final effort, the fox's paws cling to the brush. The fox's body thus acts as a bridge and they are saved.” [Translation]

¹ Soudani, M., Soudani-Bani, O., Sarafian A. and Héraud, J.-L. (2018). Lecture scientifique de l'album *Bascule* et proposition d'une séquence d'enseignement en cycle 3. *Grand N*, (101), 5-22.

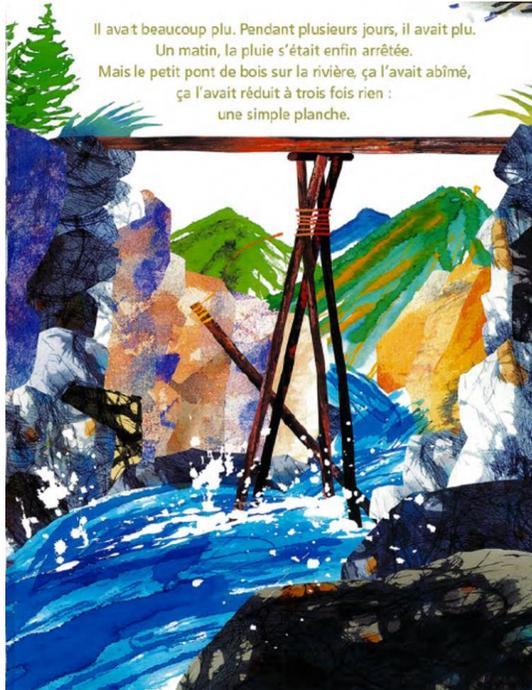
To begin, analyze the picture book to highlight the scientific and technological content of the story.



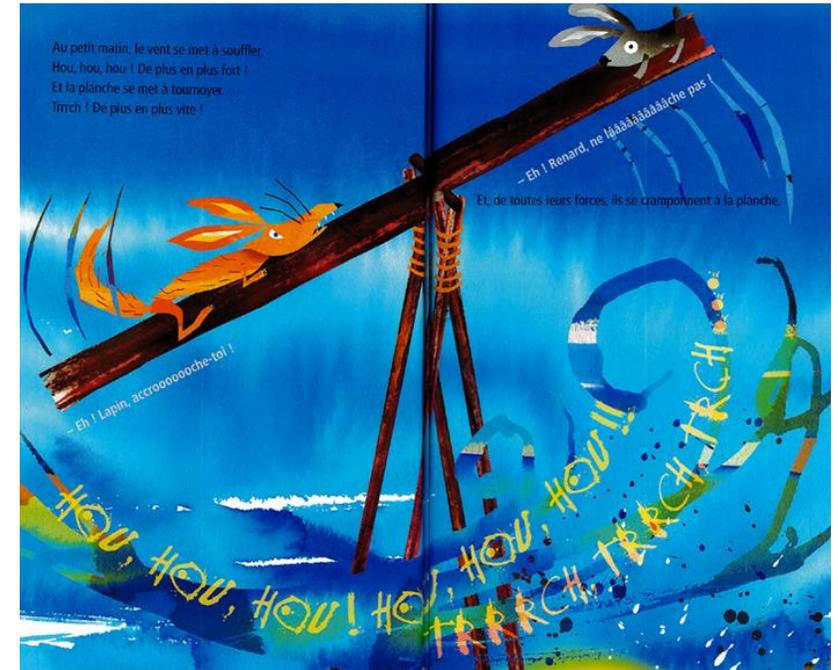
	Narrative structure	Scientific dimension (scientific learning for students)
Exposition	A rabbit, chased by a fox, crosses a bridge over a river.	The bridge, an object in perpetual balance: a tree trunk acting as a connecting board rests on two rocks positioned on either side of the river.
Catalyst for the story	Under the weight of the fox, the board starts to move and the stones on the bank start to tumble. The rabbit is stuck at the other end and can't move forward. The board tilts at one end.	The bridge has turned into a see-saw. The balance is no longer constant. By stepping onto the bridge, the fox has disrupted the balance.
Resolution of the conflict through actions or events	The fox must not move any further. To avoid risking their lives, the rabbit and the fox must stay still.	The parameters affecting balance (mass and distance) vary: the fox moves, a murder of crows comes to land on the board. A simple change in position or mass can disrupt the balance. These disruptions show that mass and distance on the same side must change in opposite directions in order for the equilibrium to be maintained or restored.

Scripting the reading of the picture book

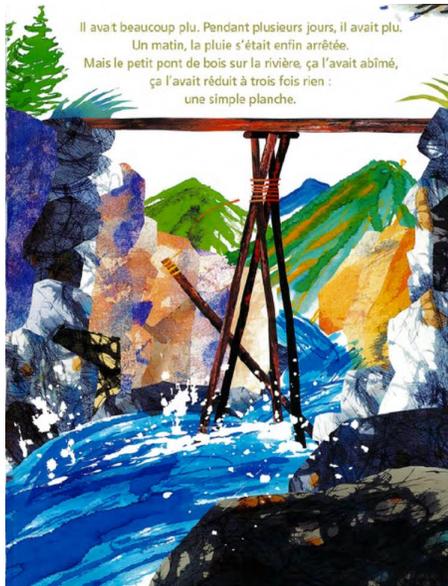
1. Present the front cover and the first two pages of the picture book, and collect spontaneous observations from the students.



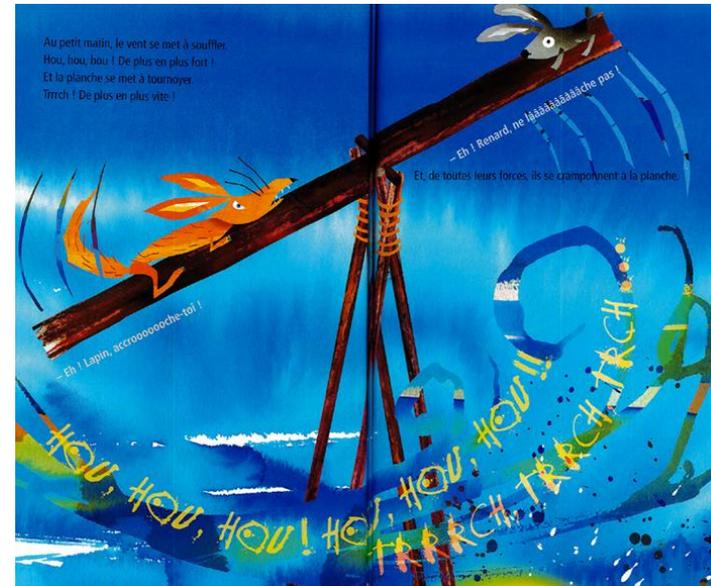
2. Present page 13 as the end of the story and ask students to imagine what might have happened to bring the characters to this "final" situation.



- Working with the image on the first page, excluding the bridge, have the students reconstruct the bridge using pictures of boards that are too short. This problem requires further elements to build up the bridge (stones, pilings, supports, etc.) that the students will have to cut out from a sheet of paper and glue to the page.

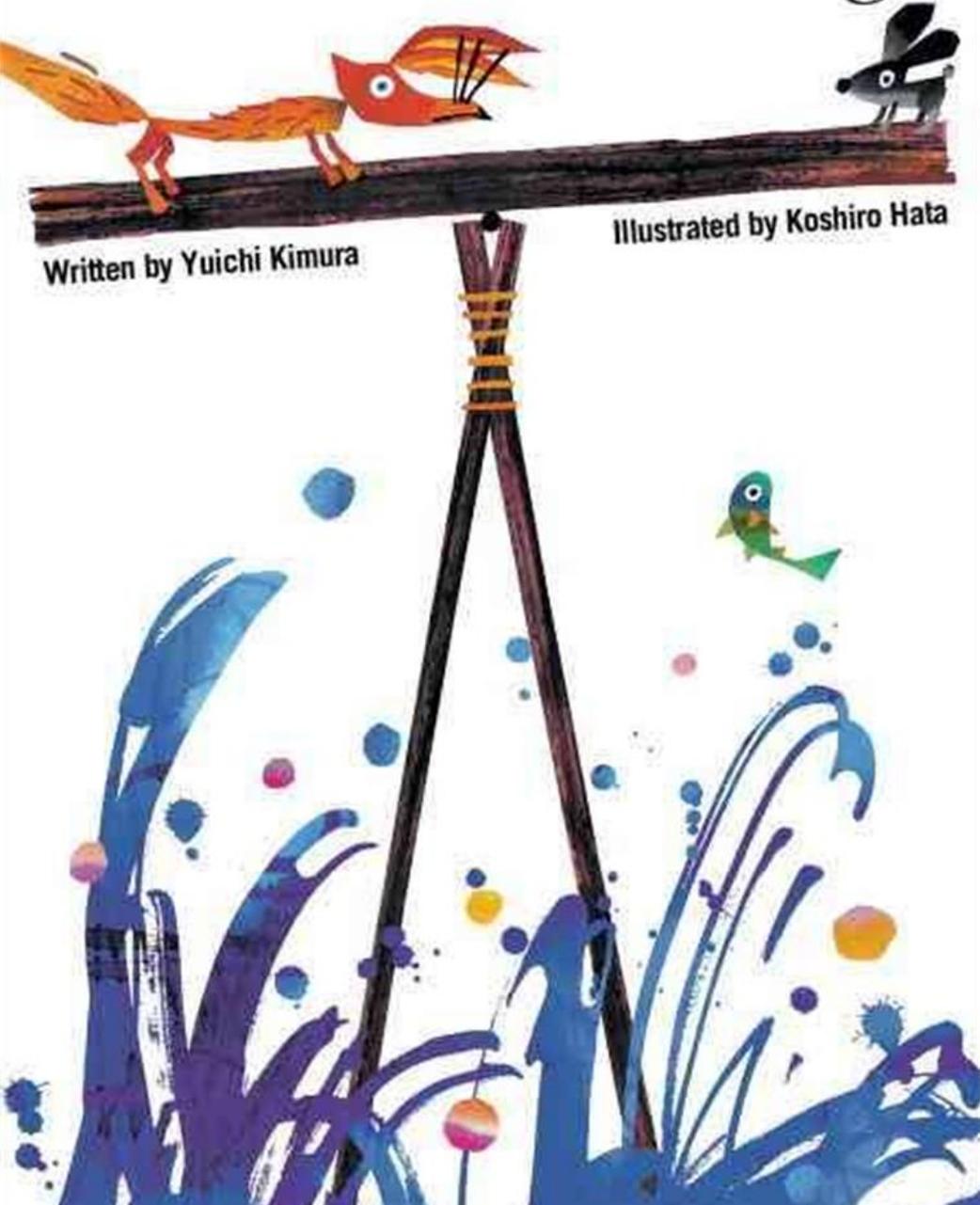


- Make connections between the bridge they have just made and the state of the bridge on page 13.



- In groups, the students simulate the two situations (the bridge and the see-saw) using objects they have on hand (glue stick, book, pencil box, ruler, etc.). Each group uses their creations to explain the difference between a bridge and a see-saw, in terms of both structure and function.

On the See-Saw Bridge



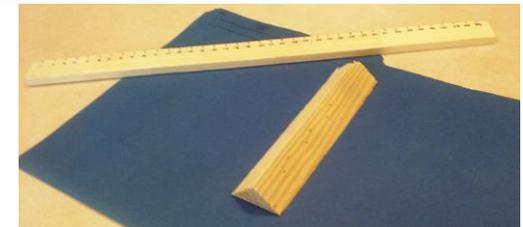
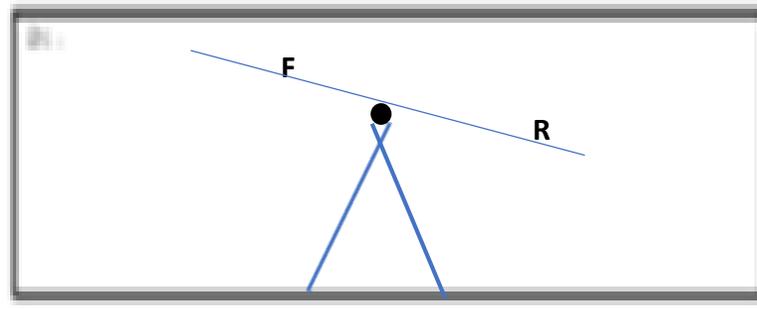
6. Go back to the first few pages while hiding the text and ask if a bridge or a see-saw can be seen. Lead the observations and discussions towards equilibrium, its conditions and its disruption (mass and distance from the fulcrum).

Continue reading the picture book and observe the parameters that affect the balance of the board.

Experimenting to challenge the imaginary with reality

7. Draw a diagram of the different events in the story, from page 1 to page 6, representing the fox with an "F" and the rabbit with an "R."

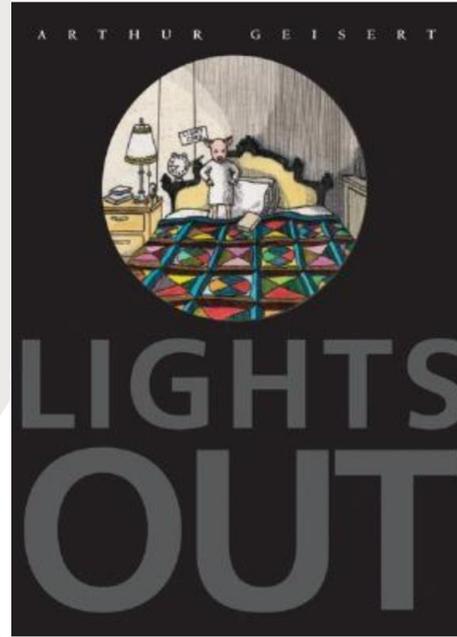
Use these diagrams to experiment with the events in question, using a math balance. The students thus practise associating the text and images of the picture book which model the fictional event with the experimental manipulation of the balance.



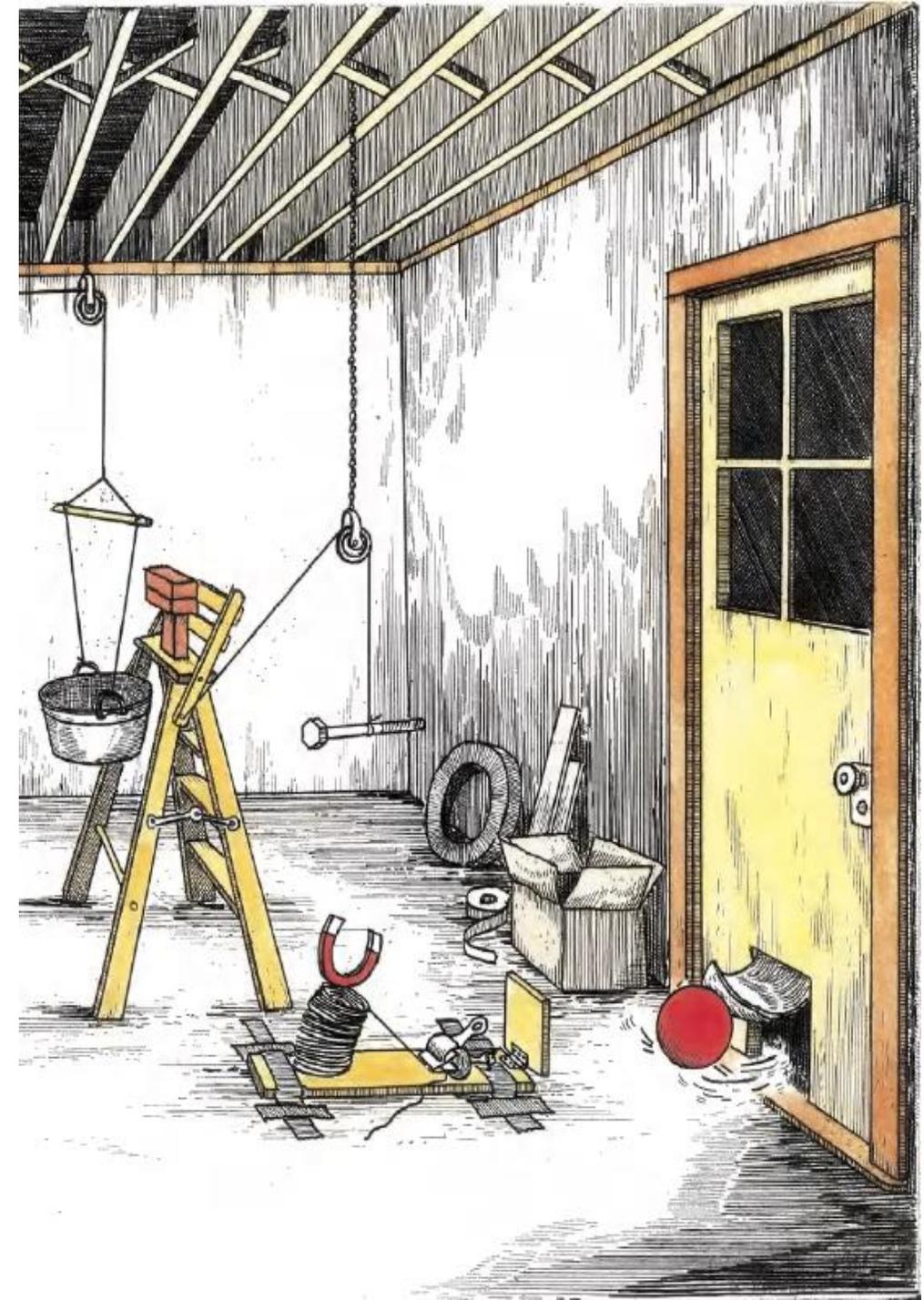
Exploring the principle of causality: The relationship between cause and effect

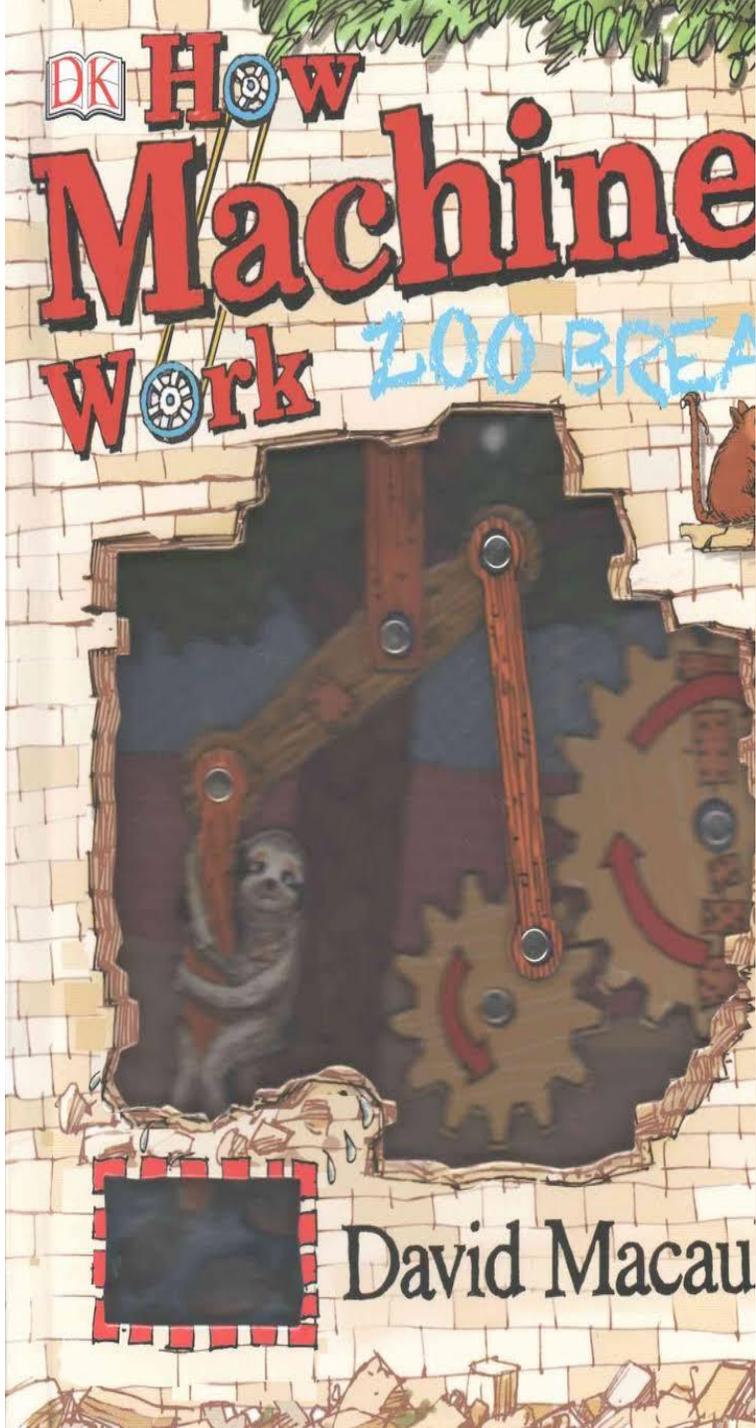
This is the story of a little pig who has trouble falling asleep in the dark. He develops a system that turns the lamp off for him, once he is asleep.

Throughout this wordless book, the illustrations allow the reader to discover, step-by-step, the assembly of objects set up by Little Pig. The details of the images provide an understanding of how the invented machine works. The concepts of causality (cause and effect), simple machines and technological analysis can be constructed.



Lights Out. Arthur Geisert, 2007.

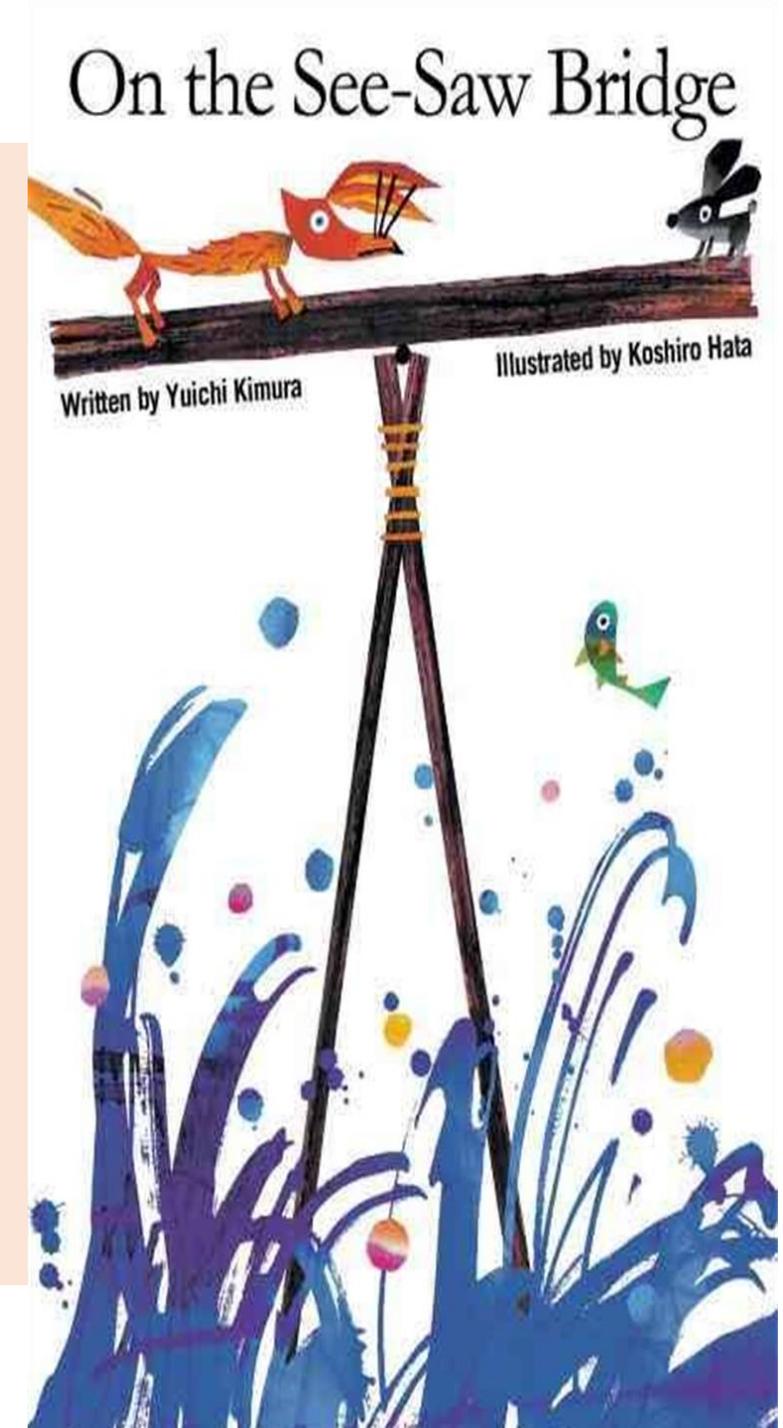




Using children's literature to teach science and technology

Using non-fiction to appreciate literature and support the quest for solutions

Using realistic fiction picture books to challenge the world view of fictional picture books with reality by encouraging the students to wonder and to ask questions about scientific concepts



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Thank you!

Any questions?

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