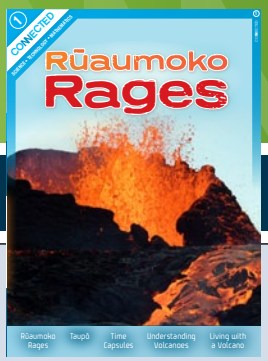
Time Capsules

by Ken Benn

CONNECTED 1
SCIENCE • TECHNOLOGY • MATHEMATICS



Overview

This article describes how the ancient cities of Pompeii and Herculaneum, destroyed nearly 2000 years ago by a volcanic eruption, were preserved by the eruption and now show people what life was like in these cities long ago. Modern technology has allowed archaeologists to excavate the volcanic ash and to discover details about the eruption and about the artefacts that remain.

Curriculum context

TECHNOLOGY

NATURE OF TECHNOLOGY

Characteristics of technological outcomes

Achievement objective

L1: Students will understand that technological outcomes are products or systems developed by people and have a physical nature and a functional nature.

Key ideas

- Technology involves people designing and making **things** to meet a need or opportunity.
- These **things** are called technological outcomes.
- Technological outcomes have both physical and functional attributes.

Learning goal (to be shared with your students)

In this activity, we are learning:

- to identify a technological outcome.

TECHNOLOGICAL PRACTICE

Brief development

Achievement objective

L1: Students will describe the outcome they are developing and identify the attributes it should have, taking account of the need or opportunity and the resources available.

Key ideas

- Technologists design and test technological outcomes before creating them.
- When designing a new technological outcome, the technologist needs to:
  - consider the need or opportunity they are meeting
  - identify the attributes the technological outcome requires.

Learning goal (to be shared with your students)

In this activity, we are learning:

- to design a technological outcome.

MATHEMATICS

GEOMETRY AND MEASUREMENT

Measurement

Achievement objective

L1: Students will order and compare objects or events by length, area, volume and capacity, weight (mass), turn (angle), temperature, and time by direct comparison and/or counting whole numbers of units.

NUMBER AND ALGEBRA

Number knowledge

- L2: Know how many ones, tens, and hundreds there are in whole numbers to at least 1000.

Key idea

The mathematics in this article relates primarily to understanding centuries of time.

- Time is measured in units.
- Time can be described in different ways.

Learning goal (to be shared with your students)

In this activity, we are learning:

- to relate dates (in years) to centuries.

ENGLISH

READING

Ideas

Achievement objective

L3: Students will show a developing understanding of ideas within, across, and beyond texts.

Indicators

- Uses their personal experience and world and literacy knowledge confidently to make meaning from texts.
- Starts to make connections by thinking about underlying ideas in and between texts.
- Makes meaning of increasingly complex texts by identifying main and subsidiary ideas in them.

Structure

Achievement objective

L3: Students will show a developing understanding of text structures.

Indicator

- Understands that the order and organisation of words, sentences, paragraphs, and images contribute to and affect text meaning.

The Literacy Learning Progressions

The relevant knowledge, skills, and attitudes for students at this level are described in the The Literacy Learning Progressions.

Suggestions for providing literacy support for the key ideas

The following strategies will support students to engage with the ideas and information as they use the text for particular curriculum purposes.

The *Connected* series includes a range of texts that provide opportunities for students to locate, evaluate, integrate, and synthesise information and ideas.

It is expected that students will read across the range of texts in this *Connected* to develop their literacy skills and their understanding of the topic.

Text characteristics

- Geographical, technical, and subject-specific vocabulary
- Informative, explanatory text style
- Use of first-person plural as a device to include the reader
- Maps, photographs with captions, and subheadings support the text
- An ancient parchment image as background to the text, adding visual context and interest.

1. FINDING THE MAIN IDEAS

This article describes the excavations of Pompeii and Herculaneum, outlines what archaeologists have learned from the sites, and discusses processes for protecting the sites in the future.

The main ideas in the text include:

- Pompeii and Herculaneum were destroyed when Mount Vesuvius erupted.
- Many inhabitants were killed by extreme heat and poisonous gas.
- The two cities lay hidden for centuries.
- The sites, and the shapes of bodies of people and animals, were preserved by the volcanic ash.
- Archaeologists excavate the sites to find out how the people in those times lived.
- Archaeologists now have to find ways to preserve the ruins that they have uncovered.
- In relation to a human lifetime, the time frame from when Mount Vesuvius erupted to when the buried cities were rediscovered is a long one.

Before reading, you could explore the meaning of the term "time capsules" with your students.

Before reading, **PROMPT** the students to make connections by locating Pompeii on the map.

MODEL the process of thinking about the images in terms of a reader's emotional response:

Seeing those photographs of the sculptures makes me feel a bit sad. It's hard to imagine that they were real people, going about their daily life.

I wonder who the dog belonged to … they must have had dogs as pets in ancient Italy.

When students have responded to the images, they can be drawn into the information.

IDENTIFY aspects of the structure such as the title, headings, sections, and paragraphs that will help students navigate the article and locate the main ideas.

EXPLAIN that the headings and questions give clues about the main ideas in each section

PROMPT students to consider how these features can help their understanding.

Why do you think the article is entitled "Time Capsules"? What information do you think you will find under the heading Discovering the Cities? Where would we find information about what killed the inhabitants? Why are some of the headings written as questions? What's the main idea in this first paragraph? Where can you find extra information about the photographs?

Have the students **SUMMARISE** the main points. Discuss the information in each paragraph and then ask them to identify the main idea(s) in their own words.

What is this paragraph about? What idea is the most important?

2. DEALING WITH UNFAMILIAR VOCABULARY

IDENTIFY any challenging vocabulary.

Topic-specific verbs (used to describe the processes) include "erupted", "destroyed", "discovered", "excavated", "removed", "preserved", and "uncovered". Precise nouns, which may be unfamiliar, include "architect", "peasant", "capsules", "sculptures", and "debris".

The letter–sound knowledge of English speaking students will be challenged by the proper nouns: the Italian city names and an Italian archaeologist.

IDENTIFY ways that students could identify unfamiliar words.

*This section, headed Discovering the Cities, has the city names that we have learned. When we glance down the page, those words are easy to spot because they have capital letters. There are other words that we may not be familiar with. This sentence talks about an **architect** who discovered Pompeii. Let's check we know what an architect is.*

SCAFFOLD their learning by providing headings, such as Processes ("excavated", "preserved"), People ("archaeologist", "architect"), and Things ("resin", "cocoon"). Students could use these to create a table to record words they need to understand.

Exploring the technology

The following activities and suggestions are designed as a guide for supporting students to develop understandings about the nature of technology and technological outcomes.

Key ideas

- Technology involves people designing and making **things** to meet a need or opportunity
- These **things** are called technological outcomes.
- Technological outcomes have both physical and functional attributes.
- Technologists design and test technological outcomes before creating them.
- When designing a new technological outcome, the technologist needs to:
  - consider the need or opportunity they are meeting
  - identify the attributes the technological outcome requires.

Activity 1: *Identifying a technological outcome*

Before reading "Time Capsules", discuss the meaning of "technology". Present a selection of items (either actual things or images) familiar to the students. Ensure that the selection includes a mix of natural items and technological outcomes. (Many students think that technology includes only electronic items, so make sure that some non-electronic technological items are included.) Items could include rocks, a pen, grass, an item of clothing, a bottle, a computer mouse, a telephone, some keys, and a photo of a baby.

Have the students sort the items into two groups, those not made by people (the natural things) and those made by people (the technological outcomes). Discuss the meaning of "technology". Technology is when people design and make things that meet a need or solve a problem – things that make their lives easier. Introduce the term "technological outcome". Things created through technology are technological outcomes.

Students can then cut images of items out of magazines and sort them into three groups – "natural things", "technological outcomes", and "I'm not sure".

When the students have grouped their images, revise the meaning of "technological outcome". Have them check their groupings, keeping in mind that a technological outcome is designed and made by people to meet a need or an opportunity.

As a class, discuss the "I'm not sure" items. Use the criteria for a technological outcome to decide how to categorise these items.

The students can reread the article, then create a class list of technological outcomes that would have been in Pompeii and Herculaneum. Prompt them to scan the text and the photographs for technological outcomes that were discovered when the cities were excavated. Additional technological outcomes, for example, bread, carts, pots, and candles, can be inferred. Others can be seen on websites about Pompeii and Herculaneum. Ask questions to prompt discussion.

Which technological outcomes have remained recognisable after the eruption of Mount Vesuvius?

Which technological outcomes have been destroyed?

What happened to the natural things?

Activity 2: *Exploring attributes*

Explain that all technological outcomes have a physical and a functional nature. The physical attributes describe what it looks like and what it is made from (for example, a drink bottle is clear and light and has a lid). The functional attributes describe what it can be used for (for example, a drink bottle can hold water, stop it from spilling out, and be used to drink from).

Archaeologists would have examined the artefacts from Pompeii and Herculaneum and used their physical attributes to work out what each technological outcome was for. Your students can do the same by playing a version of the hedbanz game. (See www.hedbanz.com)

The students work in pairs or in a team. Each student takes a turn describing a technological outcome to their partner or group. They hold this item under a cloth, then describe the physical attributes to the rest of the team. A points system is used where the describer receives a point for every clue given until the partner or the rest of the team correctly guesses what the technological outcome is. The more clues a person can give, the more points they make. This game can later be played describing the functional attributes of a technological outcome.

An example is:

A marker pen

Physical attributes	Functional attributes
It is red.	It comes in different colours.
It has a lid.	It has a lid.
It has writing on it.	I can write with it.

Activity 3: *Designing a Pompeii protector*

Students can design a technological outcome to protect Pompeii from further damage. This technological outcome can be called a "Pompeii protector".

Have students reread page 22. Prompt a class discussion about the ways ancient sites can be damaged. Discuss technological outcomes and processes that are used to protect precious artefacts or sites. Make a class list of the functional attributes a Pompeii protector would need. Can the students suggest any of its physical attributes?

Brainstorm possible ideas for a Pompeii protector. Accept all suggestions but check them against the class list of functional attributes. Group the suggestions into two types, "technological outcomes" and "processes".

Technological outcomes	Processes
A clear plastic walking platform above the site	Limiting the numbers of visitors
An invisible covering on all surfaces	Visitors permitted to walk in single file only
A surveillance system that sounds an alarm when visitors touch any artefact	No backpacks or bags allowed into the sites

Students can then proceed to design a technological outcome that can be used as a Pompeii protector. They can draw their outcome and label its functional and physical attributes.

MINISTRY OF EDUCATION RESOURCES

- Building Science Concepts (BSC series):
  - *Fossils Picture Pack* (2003). Wellington: Learning Media.

FURTHER RESOURCES

Websites that provide information about Pompeii and Herculaneum include:

- www.tepapa.govt.nz/WhatsOn/exhibitions/ADayInPompeii/TheExhibition/SeeTheObjects/Pages/Burialobjects.aspx
- www.tepapa.govt.nz/WhatsOn/exhibitions/ADayInPompeii/TheExhibition/Pages/VisitaRomanhouse.aspx

Exploring the mathematics

There are good opportunities for mathematical discussion in this article, particularly around understanding time frame and temperatures. Students will also be able to develop number concepts for centuries.

Key ideas

The mathematics in this article relates primarily to understanding centuries of time.

- Time is measured in units.
- Time can be described in different ways.

MATHEMATICAL IDEAS AND LANGUAGE

- Describing time (years and centuries)
- Numbers up to 2000

FOCUS QUESTION

- How do we describe periods of time?

Activity 1: *Measuring Time*

Ask the students to brainstorm units used to measure time, placing them in order of length. Some small periods of time have a base unit of 60 (seconds in a minute, minutes in an hour), following a system developed in Mesopotamia around 2000 BC. Ask the students to identify the base units of different periods of time, for example, days in a month or year.

Longer periods of time (decade, century, millennium) have a base unit of 10. This makes time a useful context within which to explore place value. Discuss how many years there are in a decade, a century, and a millennium. Discuss the number of decades in a century and the number of centuries in a millennium.

Note that the text refers to AD 79. AD (anno domini) and CE (common era) can be used interchangeably. BC and BCE are used for years before AD 1.

Activity 2: *Marking the Centuries*

Have the students use chalk to draw a timeline on a tennis or netball court. The line should be 20 metres long, marked at 1 metre intervals. If each metre interval represents a hundred years (one century), label the intervals.

Then label the centuries.

Discuss how all the years within (for example) the sixteenth century begin with 1500.

Have the students plot events on the timeline, including:

- the Vesuvius eruption, 79 AD (in the first century, nearly 2000 years ago)
- the discovery of Pompeii in the late 1500s (at the end of the sixteenth century)
- the discovery of Herculaneum in 1709 (in the early eighteenth century)
- the early excavations of Pompeii and Herculaneum in the mid-1700s (mid eighteenth century)
- the development of a new system for excavation by Fiorelli in 1863 (mid-nineteenth century).

Have the students stand on specific points in time including those listed above. They could "guesstimate" the time between significant events, as > 100 years or < 100 years.

Have students relate what they have learned to age. For example, if their age is nine, they are in their tenth year. A child in their first year is not yet one.