Integrating Science and History Learning:

The Remembering Titanic Project

6th January 2024

ASE 2024 Conference (University of Northampton)

Wonyong Park, Neta Shaby & Rachele Newman

University of Southampton



Project team



Wonyong Park
Science Education &
Disaster Education



Neta Shaby
Informal Learning &
Science Education



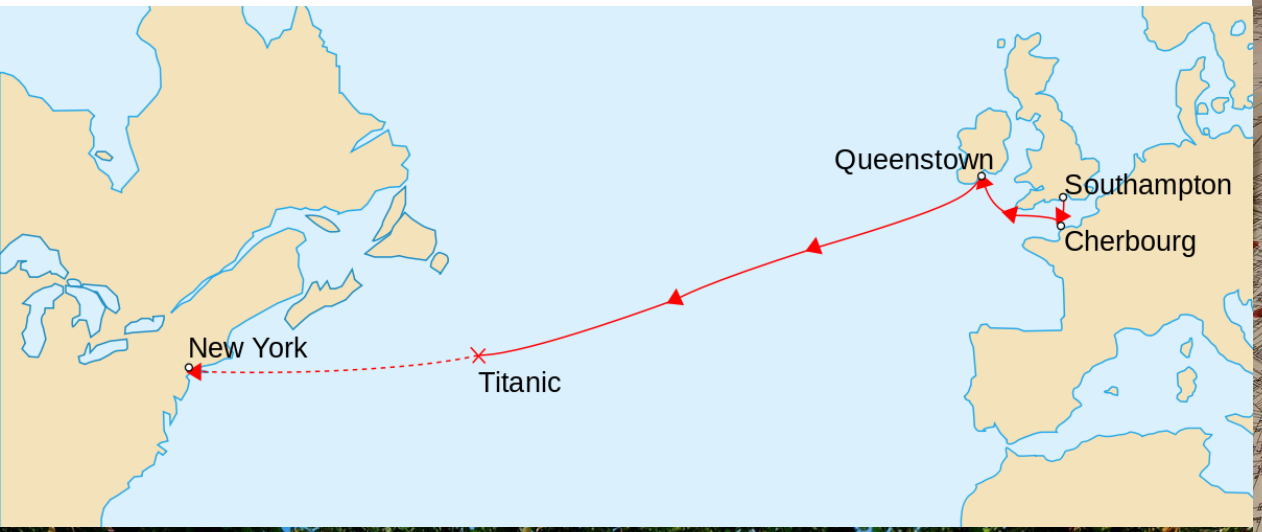
Rachele Newman
History Education &
ITE



Tilly Scotthorne
UG Research
Assistant

Partners & Participants

- **SeaCity Museum** (Andy Skinner, Liza Morgan, Victoria Philips)
- **4 History, 3 Science teachers** from secondary schools in Southampton & Fareham











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Cross-curricular professional development

Integrating school subjects (Science & History)

Integrating school-based and out-of-school learning

Place-based learning

Disasters and tragedies



Learning about local history can be beneficial to future citizens, by stimulating place attachment and civic engagement, and providing authentic experience of doing history. At the same time, awareness of the importance of integrating informal and outdoors learning environments into the curriculum have been on the rise. Focusing on the integration of formal and informal education in the context of teaching local history of RMS Titanic, this project aims to work with history and science teachers, pupils (Key Stage 3; age 11-14) and museum educators to develop and pilot a curriculum unit focused on the history of Titanic and Southampton. Historical records and artefacts from the Titanic Inquiry Project (https://www.titanicinquiry.org/) will be used to explore the Titanic disaster from scientific and historical

The Titanic disaster: Impact on Southampton

- 724 crew lived within the Southampton area and only 175 of these survived.

- More than 500 households in Southampton lost at least one family member, and entire neighbourhoods were affected.



Doomed departure: Titanic's home port was Southampton (Image: Alamy)

NEWS | POLITICS | FOOTBALL | CELEBS | TV | CHOICE | ROYALS

EXCLUSIVE: The city that lost a generation to the Titanic disaster

As the 100th anniversary approaches, RMS Titanic's home port of Southampton still suffers the consequences of the disaster

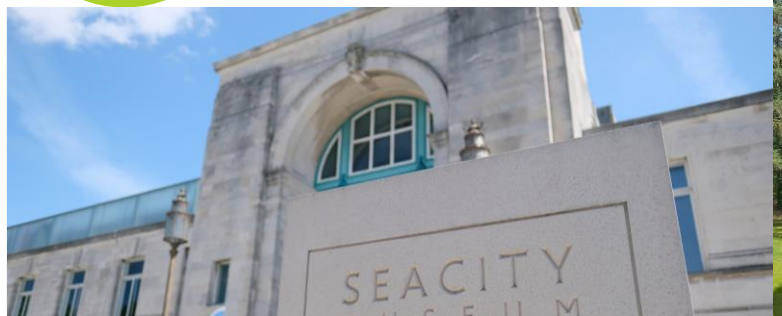
By Euan Stretch
00:00, 24 Mar 2012 | UPDATED 01:46, 24 MAR 2012

BOOKMARK

Project timeline

Workshop 1

22 Feb 2023
SeaCity Museum



Workshop 2

25 Apr 2023
(Boldrewood Campus)



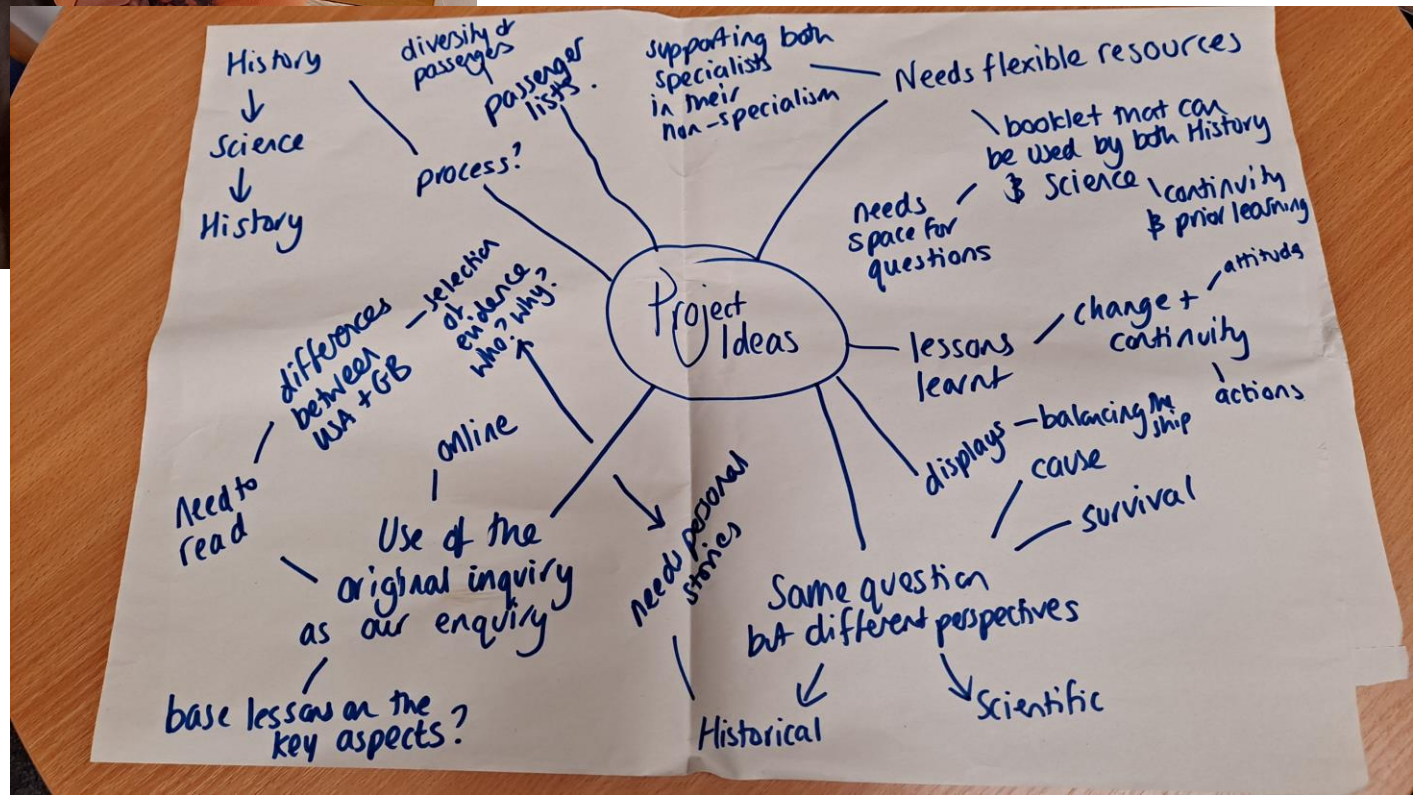
Workshop 3

29 Jun 2023
Avenue Campus



Date	Phase of CPD	Activities
February 2023	**Workshop 1** **(150m)**	Introductions Purpose of the project Why integrate science and history? Benefits and approaches Comparing the Key Stage 3 Science and History programmes of study Why is informal education important? Strategies for integrating informal and formal learning Guided tour of [Museum Name] Sharing initial ideas about the unit
May 2023	**Workshop 2** **(150m)**	Summary of Workshop 1 Place and community-based learning Disaster and tragedy education Developing a skeletal scheme of work for six lessons Planning workflow Wrap-up
	Individual work between workshops	Preparing the stories of six passengers on board Preparing practical activities
June 2023	**Workshop 3** **(150m)**	Summary of Workshop 2 Developing lesson resources Exchanging feedback Reflections on the project
July to September 2023	**Collaboration after workshops**	Collating teacher and student materials


TITANIC'S
LAST HOUR
VIVID
STORY


Project Ideas
History → Science → History
diversity of passengers
passenger lists.
process?
supporting both specialists in their non-specialism
Needs flexible resources
booklet that can be used by both History & Science
continuity & prior learning
needs space for questions
differences between USA + GB
selection of evidence who? why?
online
Need to read
Use of the original inquiry as our enquiry
base lessons on the key aspects?
need personal stories
lessons learnt
change + continuity
attitude
actions
displays
balancing the ship
cause
survival
Same question but different perspectives
Historical
Scientific







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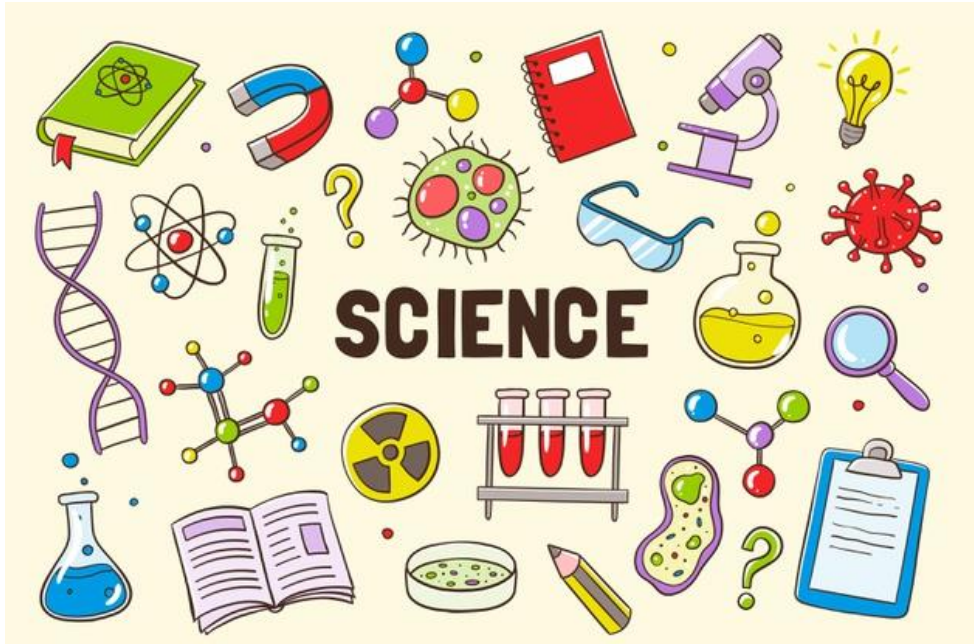
Why do we want to integrate school subjects?



The problems we face in the world are complex and require the integration of multiple disciplines, concepts, and skills to solve them (Beane, 1995).

Formal schooling: disciplinary structure, subjects taught in siloes

Real-world problems: multidisciplinary in nature (Czerniak, Weber, Sandmann, & Ahern, 1999; Jacobs, 1989)





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Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Purpose of study

A high-quality history education will help pupils gain a coherent knowledge and understanding of Britain's past and that of the wider world. It should inspire pupils' curiosity to know more about the past. Teaching should equip pupils to ask perceptive questions, think critically, weigh evidence, sift arguments, and develop perspective and judgement. History helps pupils to understand the complexity of people's lives, the process of change, the diversity of societies and relationships between different groups, as well as their own identity and the challenges of their time.

Source: Key Stage 3 National Curriculum

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Source: Key Stage 3 National Curriculum

- understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review

- understand the methods of historical enquiry, including how evidence is used rigorously to make historical claims, and discern how and why contrasting arguments and interpretations of the past have been constructed

Source: Key Stage 3 National Curriculum

Historical methods & scientific methods

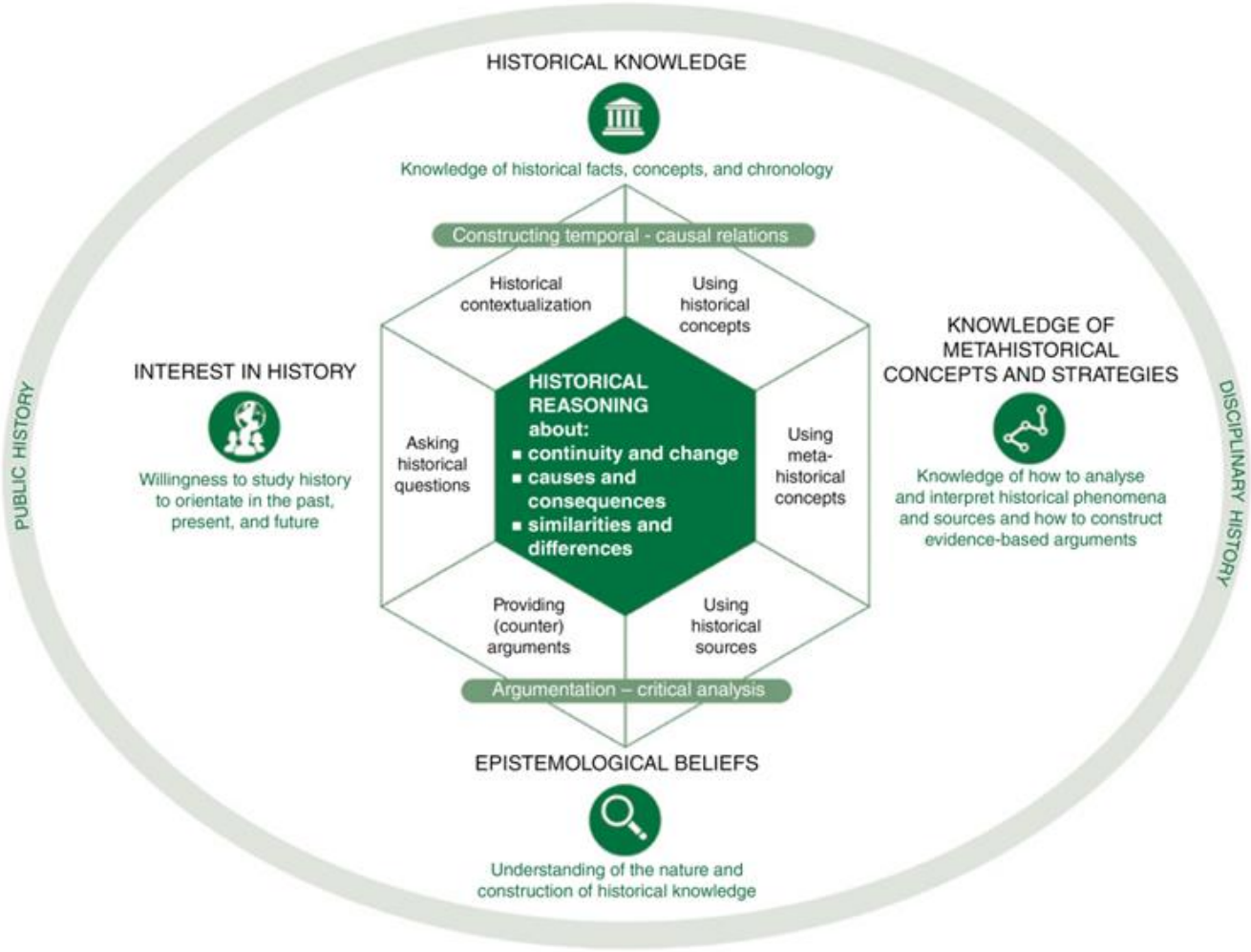


Figure 6.1 Types and components of historical reasoning and individual and sociocultural resources for historical reasoning.

Van Drie, J. & Van Boxtel, C. (2008)

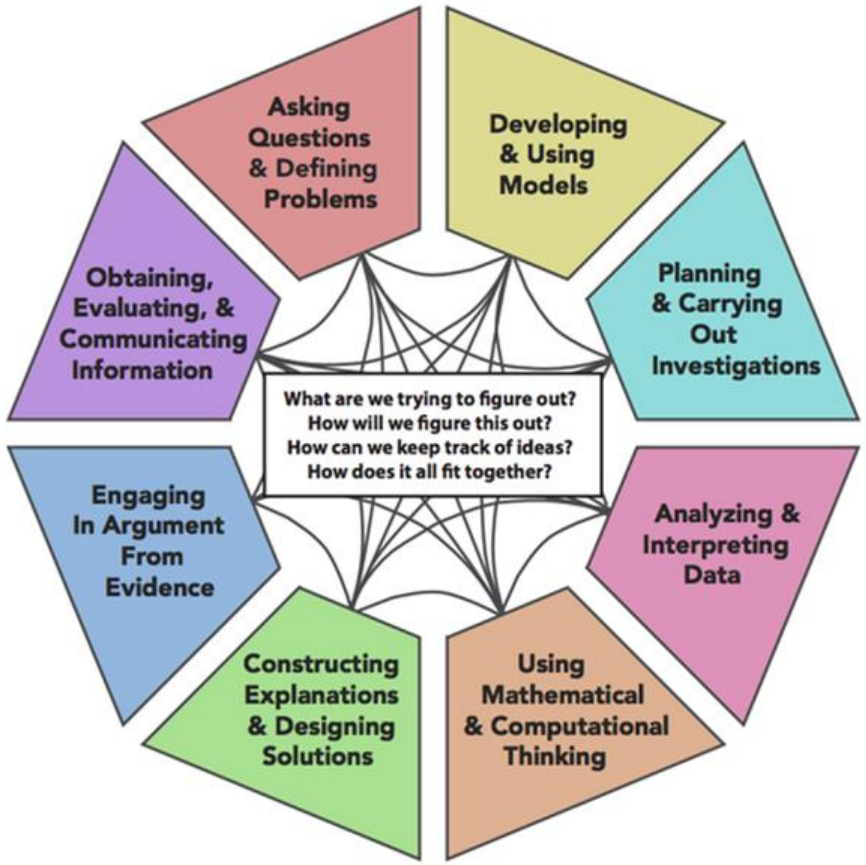
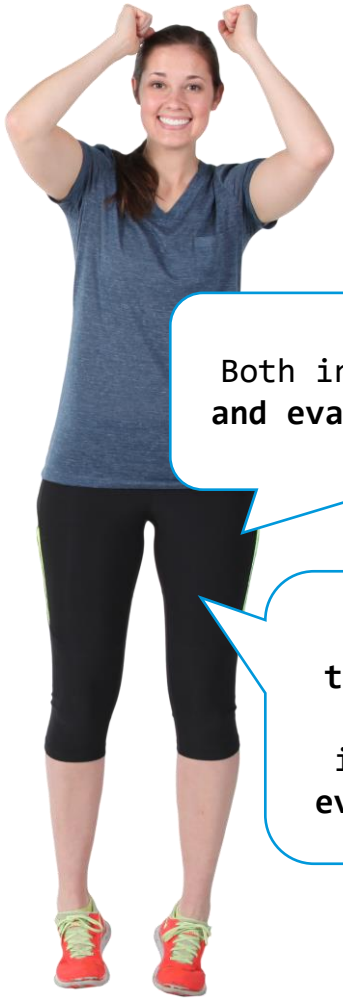


Diagram from page 14 in this chapter of this book:
Schwarz, C. V., Passmore, C. M., & Reiser, B. J. (2017). Moving beyond "knowing" science to making sense of the world. In C. V. Schwarz, C. M. Passmore & B. J. Reiser (Eds.), *Helping students make sense of the world through next generation science and engineering practices* (pp. 3-21). Arlington, VA: NSTA Press.

Teachers' survey responses



They are similar as in both, **data analysis** is essential.

Both involve **gathering and evaluating evidence**

Both can follow **an enquiry approach** to learning having a **hypothesis** and then working towards finding an answer.

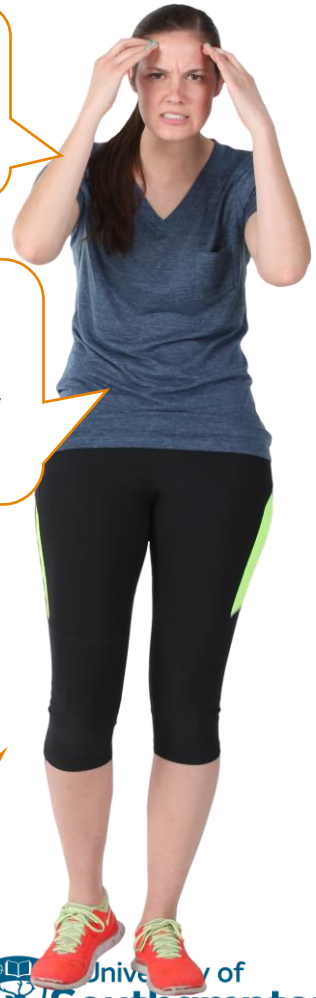
I often talk to students about **theory and evidence,** and having to have **proof** to back up historical ideas like a Scientist would need **evidence** to back up their **theories.**

Different amount of lessons for each - more content can be covered in Science; History is an option at GCSE

Science is more focused on **the present and future,** how it may change and progress whereas history is focused on retelling **the past.**

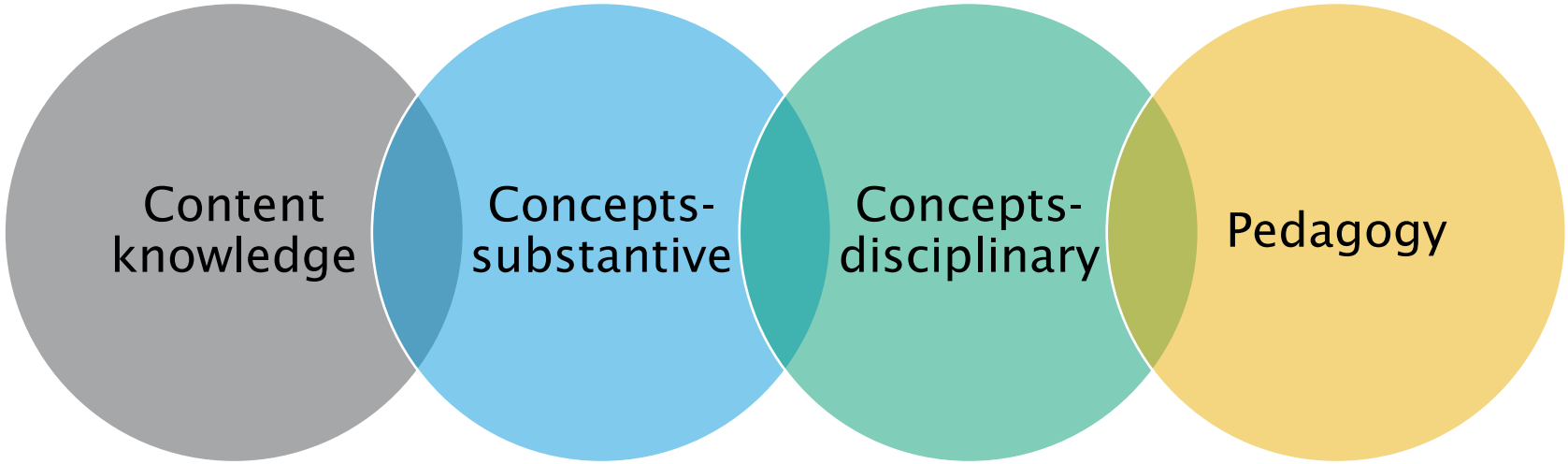
They are different as often in History there are **many interpretations of events** etc whereas Science, **there is often a correct answer.**

Methods of enquiry are different - in history you can't run **an experiment to test an argument.**



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Commonalities between Science and History at KS3?



How might these relate to Titanic?

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Unit of work

	Lesson title	Learning goals
1	Why was Titanic significant to Southampton?	• Make inferences from individual experiences about why the Titanic was significant to Southampton. • Reach a well explained judgement on why the Titanic was significant to Southampton.
2	Why was the sinking of Titanic a disaster?	• Explore and understand the popular misconception that Titanic was unsinkable • Justify why the sinking of the Titanic could be deemed a disaster
3	Who was to blame for the sinking of Titanic?	• Explore and evaluate varying aspects of culpability related to the Titanic disaster
4	How far did Titanic have an impact on the world?	• Make inferences from historical sources about the local and national impact of the Titanic disaster • Analyse the impact on sailing and shipping by identifying changes over time.
A	Watertight bulkheads	• Investigate the effectiveness of bulkheads and understand how the bulkheads on Titanic failed (with a practical activity with a plastic bottle ship)
B	Keeping afloat	• Investigate different ‘anti-sinking’ ideas • Evaluate the effectiveness of different ‘anti-sinking’ ideas

Lesson title: Why was the Titanic significant to Southampton?

Objectives:

To make inferences from individual experiences about why the Titanic was significant to Southampton.

To reach a well explained judgement on why the Titanic was significant to Southampton.

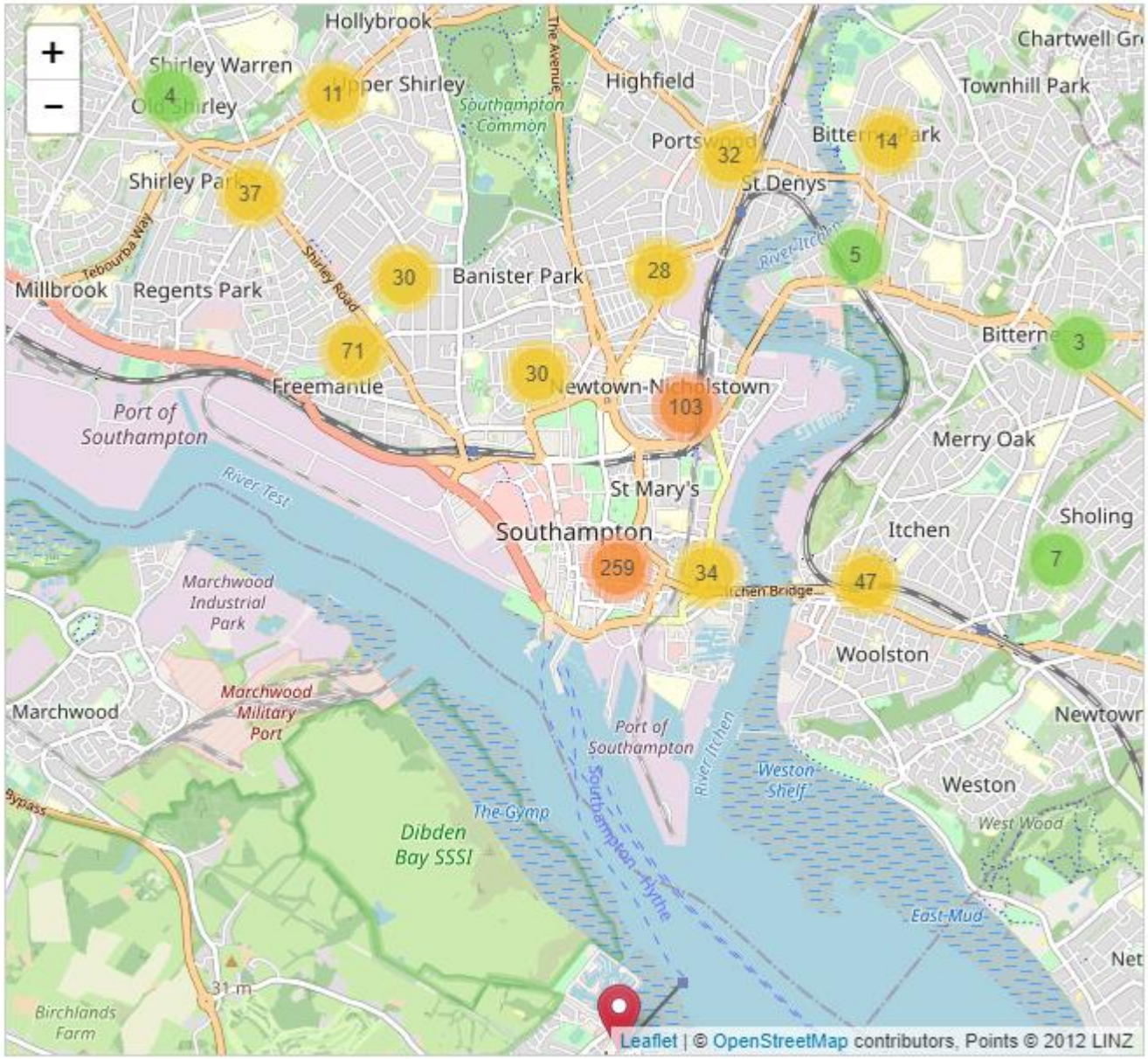
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Source inference

1. What can we learn from this source about why Titanic was significant to Southampton?

2. Which details from the source are the most useful for telling us that?

3. If we use this source for a different enquiry, which other details could be more relevant?

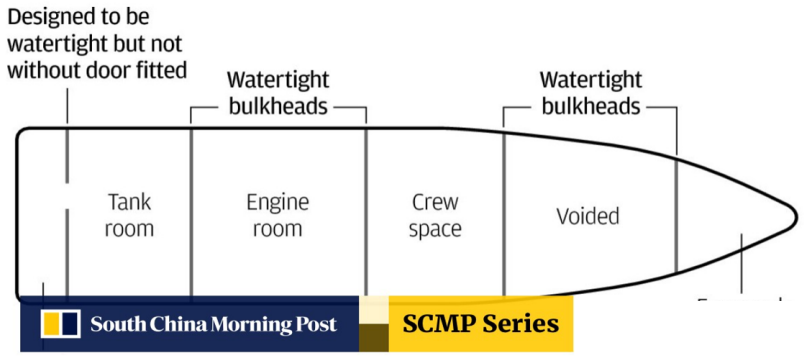


Individual	What do they reveal about Southampton at the time Titanic set sail?	What can you infer about how Titanic changed the lives of people in Southampton?	What can you infer about why Titanic would have been remarkable in Southampton?
Edward Smith			
Joseph Boxhall			
Frederick Fleet			
Alfred Frank Evans			
Joseph Scarrott			
Charles Joughin			

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Watertight Bulkheads

Watertight bulkheads are vertically designed watertight divisions/walls within the ship's structure to avoid intake of water in the compartment if the adjacent compartment is flooded due to damage in ship's hull



National Curriculum Links

This lesson focuses on the knowledge and conceptual understanding through:

- practical enquiry into the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.

By focusing on the sinking of the Titanic this gives students the context of bulkheads in a historical event, but also allows them to explain the sinking of the Titanic by describing:

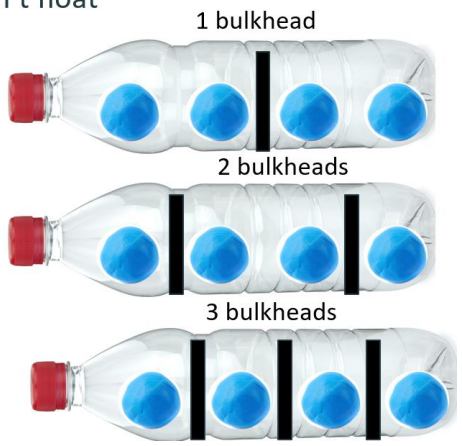
- associated processes and key characteristics in common language, and... technical terminology accurately and precisely.

Bottle boat layout



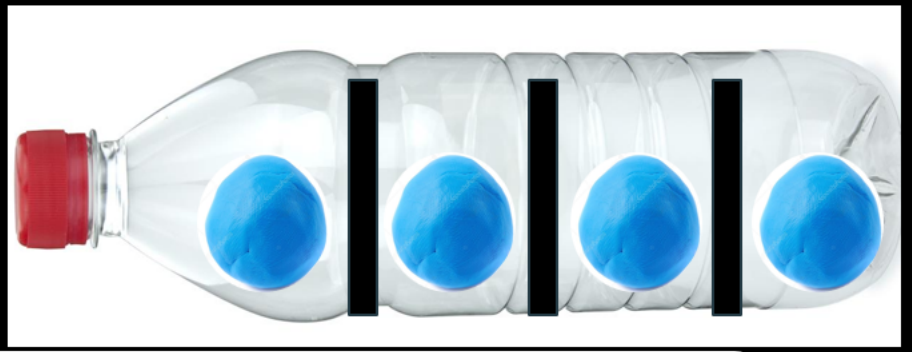
- Create your bottle boat like this one →
- Your bottle should float evenly with the cap half covered by water
- You can change the mass of the plasticine if your bottle doesn't float

- Section your bottle like this for the bulkheads→



This lesson also allows them to:

- select, plan and carry out the most appropriate types of scientific enquiries to test predictions
- use appropriate techniques, apparatus, and materials during laboratory work, paying attention to health and safety.

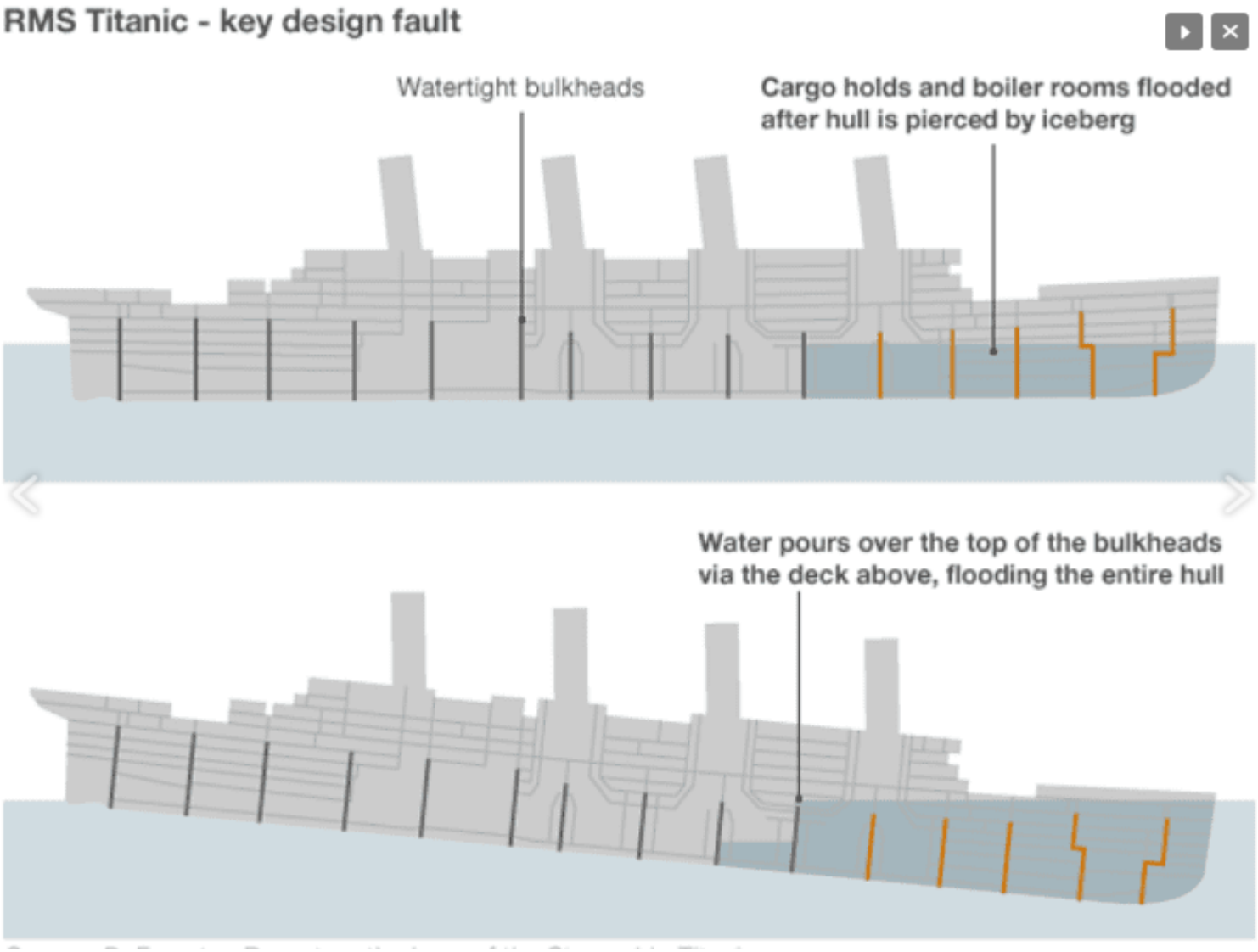


What is the purpose of a watertight bulkhead?

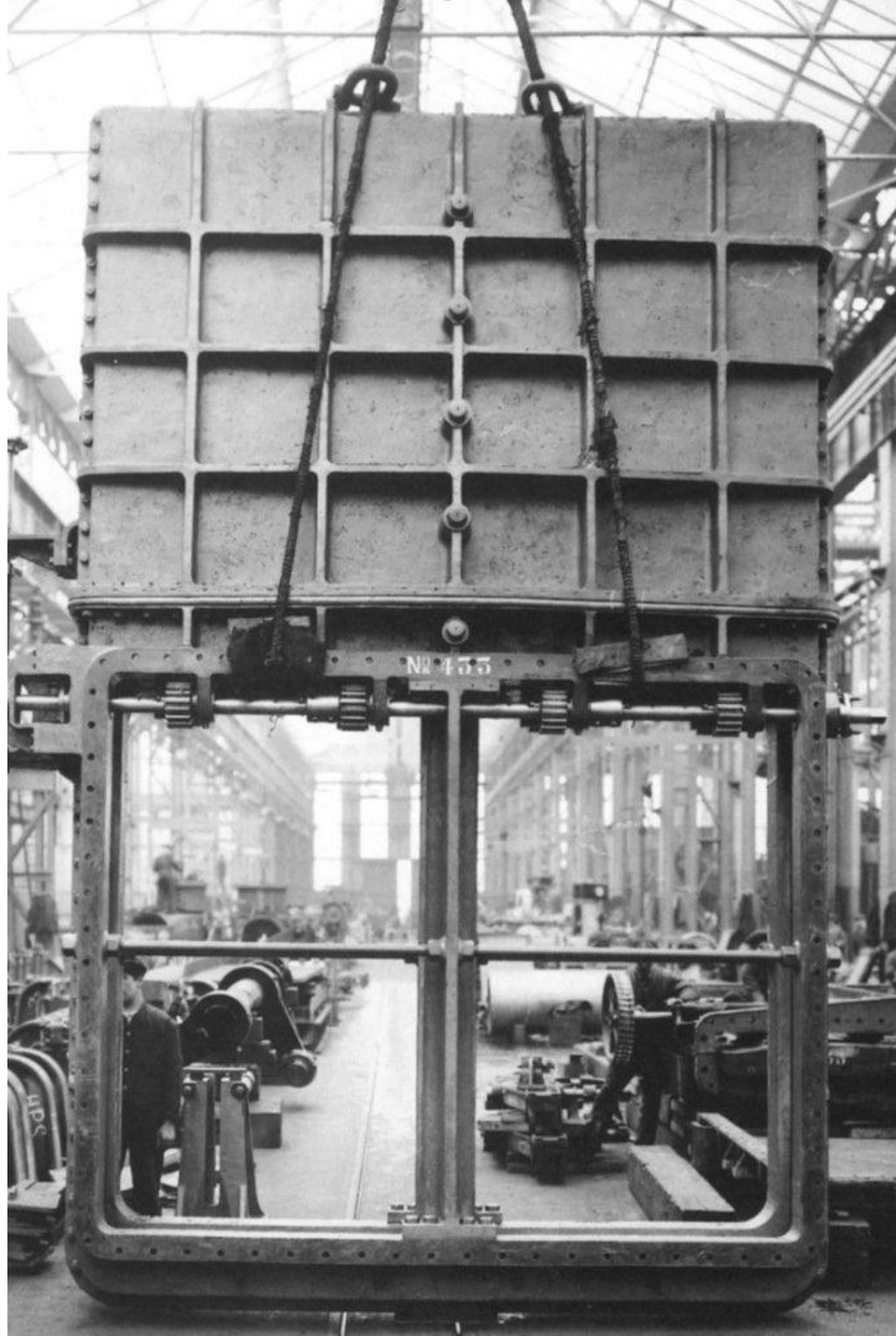
What was the independent variable?

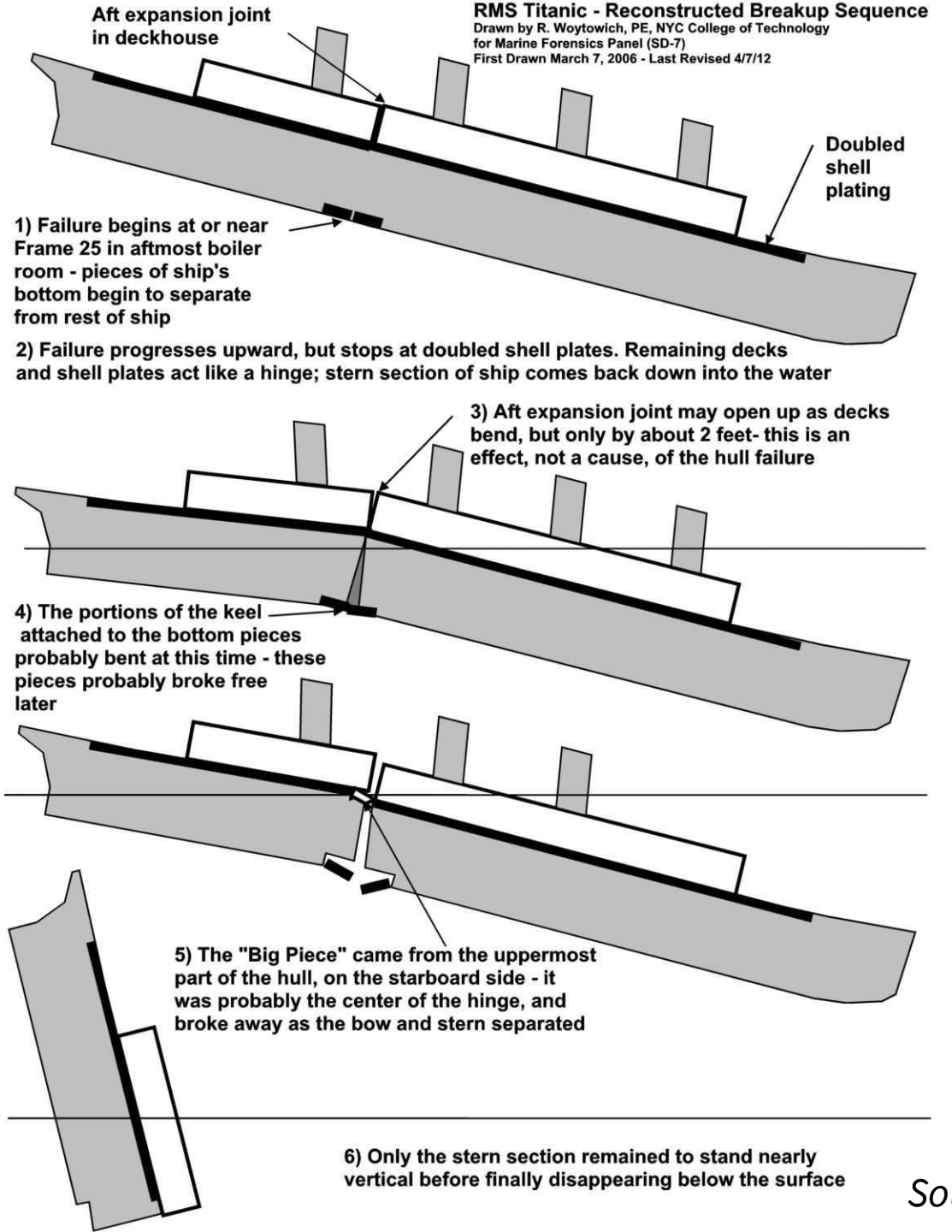
What was the dependent variable?

What were the control variables?



Source: simscale.com





KEY FAILURE:

Although the bulkheads in Titanic extended above the water line, they did not reach high enough to prevent water overflowing from one compartment into the next.

CHANGES TO THE DESIGH OF SHIPS:

Bulkheads must be high enough for the water not to spill over, and compartments should be spaced in such a way that potential flooding will not tilt the ship.

Source: simscale.com

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Impact on teachers

The project helped teachers see and attend to cross-curricular connections

> We opened up new opportunities. I think that's so true cause you know, thinking about the science lessons that the science teachers were talking about, **I could do that in history,** although I'm not a huge scientist. The this, the experiments they were devising, I was like, **if I taught history, I could actually add that experiment** on at the end, **which wouldn't be your average history lesson.** **(Melanie, interview)**

> In planning in the future, it's not just science, but if I'm teaching something and I can see there's crossover, **[I would] reach out to colleagues and other departments,** even if it's just a conversation about 'This is what I'm planning to do, or this is what we're doing at the moment. Have you covered this in any way, in a way I can build on or can link up with what you're doing?' And even if we're not doing it at the same time, if they then know right, that's what they have done in history in their planet can inform them. **So I think even from just having a casual conversation in the staff room, that's gonna be something that I'll be definitely much more aware of in planning going forward.** **(Connor, interview)**

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Impact on teachers

Teachers rediscovered Titanic as a tragic event with significant impact, which needs to be taught with respect and sensitivity

> If you think about it, actually, huge number of people died there as well. But we don't treat it with the same level of respect, I suppose. And that's certainly true for me with the **Titanic in the way I would have used to have taught it to how I would now teach it. I'm a lot more conscious of the disaster** and I'm not, obviously no one teaches about Titanic without realising it's a disaster, but it was almost more of, 'Watch a couple of clips from the movie. We'll do some fun activities where we fish people out of the water', or something like that going on. The active learning sort of trend. **(Cole, interview)**

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Reflections from the project

Various crossovers between the Science and History curricula

Understanding what pupils learn in other subjects

Using local history for community-based science learning

Unit-level integration vs lesson level integration

Cross-subject curriculum development as a form of CPD

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