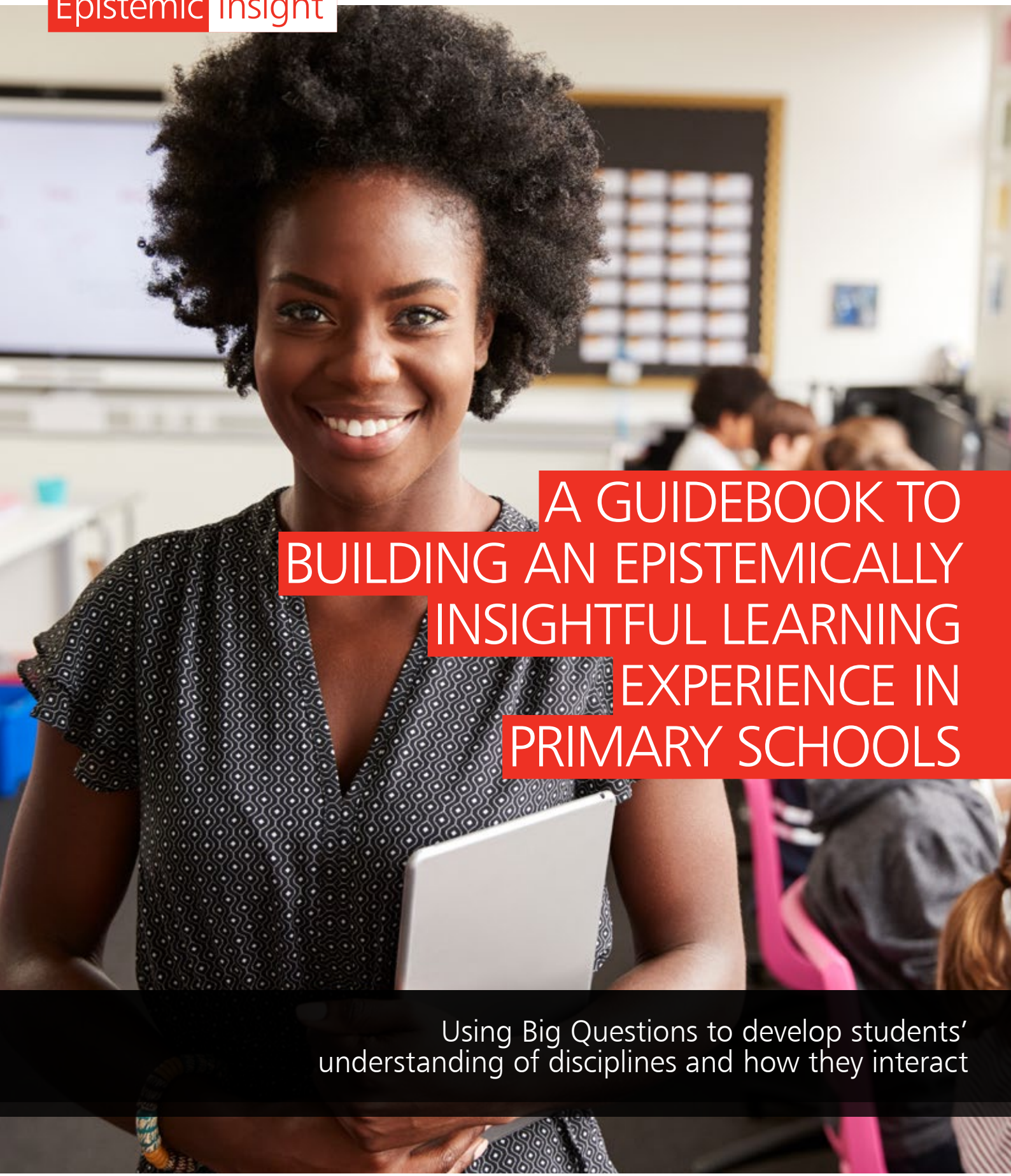
Epistemic Insight

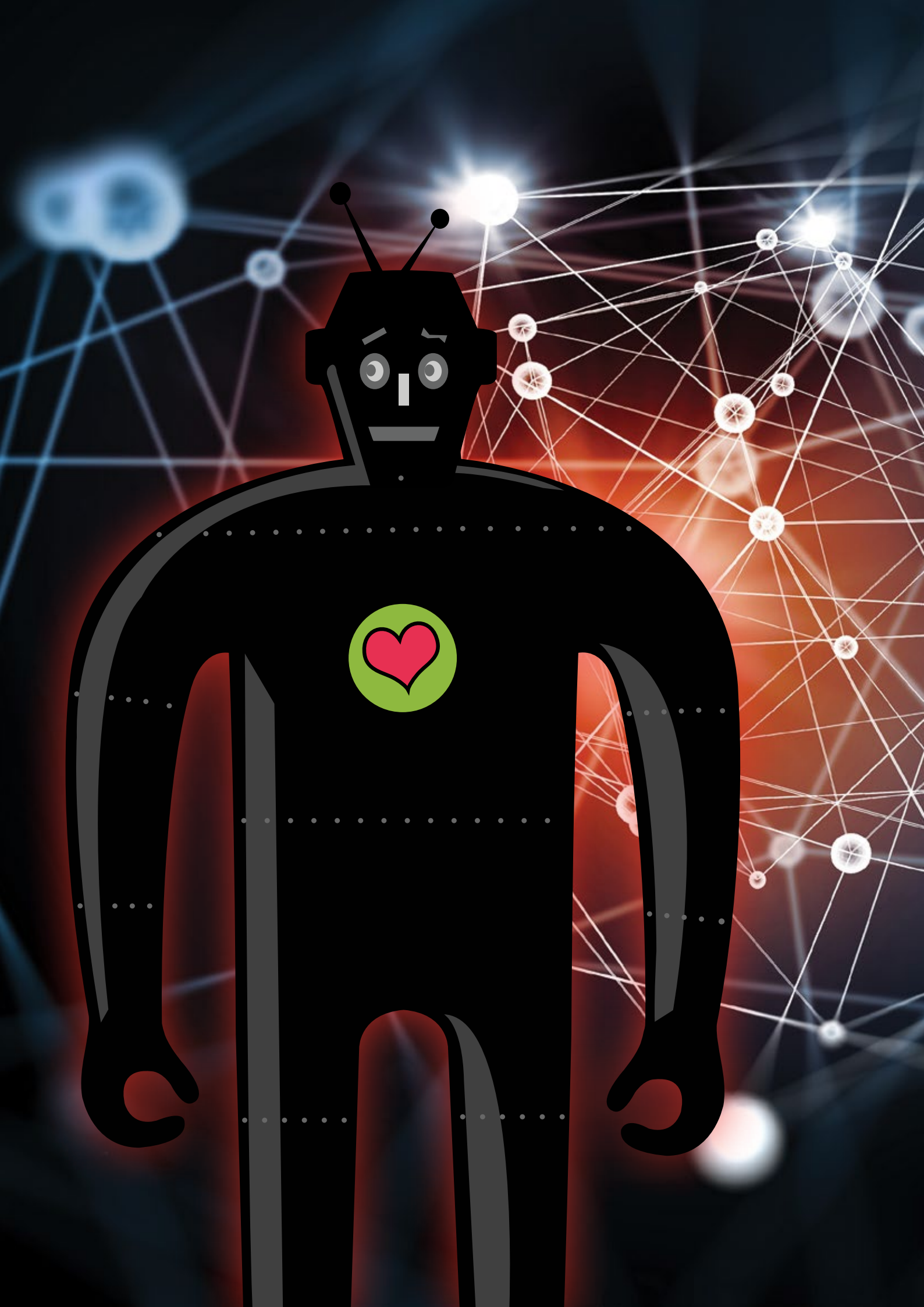


A GUIDEBOOK TO BUILDING AN EPISTEMICALLY INSIGHTFUL LEARNING EXPERIENCE IN PRIMARY SCHOOLS

Using Big Questions to develop students' understanding of disciplines and how they interact

FACULTY OF
ARTS, HUMANITIES
& EDUCATION

Canterbury Christ Church University



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HOW TO USE THIS GUIDEBOOK

This guidebook has been designed to support teachers, teaching assistants, education practitioners and ambassadors attending our CPD Seminar Series for Primary schools. The CPD examines how scholarly thinking, questioning and disciplinary knowledge can support students to understand how their curriculum links, and better appreciate the nature of science in real world and multidisciplinary contexts.

However, you can still use this guidebook individually or as a team to consider how you can support your students to be more epistemically insightful and understand how their curriculum subjects relate to each other and the "real world".

This guidebook contains information about the Epistemic Insight Initiative, the learning experiences the can be created through exploration of the curriculum intent, and practical exercises and tools that you can implement in your classroom.

Throughout this guidebook you will find short activities that are designed to deepen your understanding (and sometimes challenge misperceptions). The activities and following reflections are there to support you to develop (or make explicit) an epistemically insightful curriculum for your students.

If you are using this book alongside the seminars many of the activities will be used as prompts or developed further within the sessions. The activities can be explored individually, as a team (key stage/whole schools) even if not everyone is attending the seminars.

If you are using the guidebook on its own the "reflections" should help you to develop your understanding and draw out some of wider thinking – you can also always email the team to discuss the work further or book your own training.

This Guidebook has been written using examples from the UK Government National curriculum for students in Key Stage 1 (age 5-7) and Key Stage 2 (age 7-11) however the activities and pedagogy can be adapted (if necessary) for Scotland and Ireland as well as internationally. If you would like to understand how this could work for your curriculum, please get in touch.

Keep an eye out for the "thinking like a scholar…" Owl that emphasizes the scholarly thinking you would want to focus on with your students to explore similar concepts.

I can think like a scholar when I can...

- Explain how different disciplines investigate a question
- Illustrate how another discipline is diferent to science

ep·i·ste·mic in·sight (ĕp′ĭ-stē′mĭk ĭn′sīt′)

Epistemic insight refers to 'knowledge about knowledge', and particularly knowledge about disciplines and how they interact.

Gaining epistemic insight is about developing an appreciation of the strengths and limitations of individual disciplines. One way to do this is to explore how two disciplines each investigate a cross-disciplinary question. Consider for example how science and history can each investigate *'Why did the Fire of London spread so quickly?'*

BIG QUESTIONS

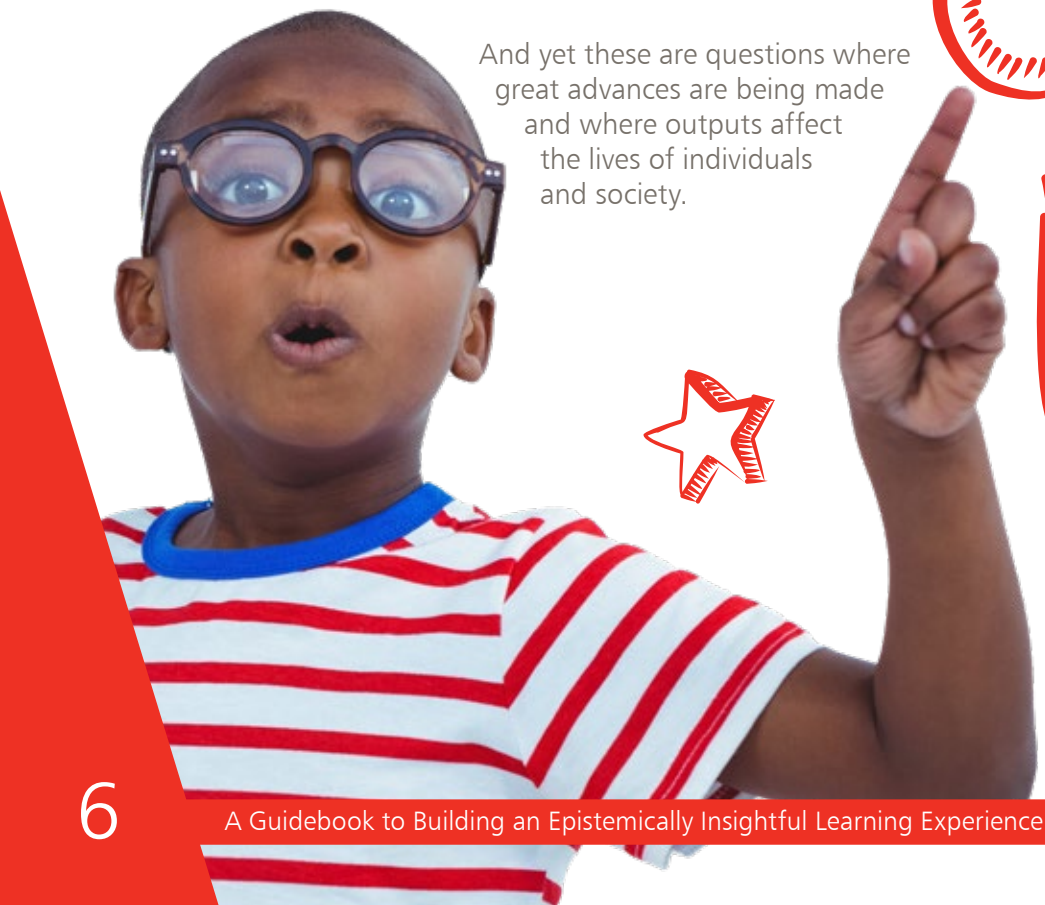
Today's Big Questions include:

- **Can a robot be a good companion?**
- **Can and should genetic engineering be used to make better people?**
- **Why do life and the universe exist?**

Big questions are frequently squeezed out of school education. That's because they don't fit neatly into one subject, they are often religiously sensitive and they call for teachers to explain how science and other areas of knowledge interact.

WHY?

Comparing how different disciplines ask and investigate questions is often not covered at school

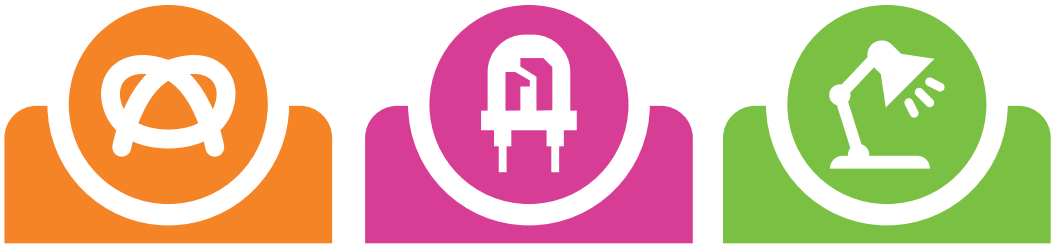


And yet these are questions where great advances are being made and where outputs affect the lives of individuals and society.

Look what happens when you include these objectives and students learn about the nature of knowledge...

THE EPISTEMIC INSIGHT CURRICULUM FRAMEWORK

The objectives below are from the Epistemic Insight Framework. They are statements about the nature of scholarship and knowledge that reflect the aims of the National Curriculum.



LEARNING OUTCOMES	Relationships between science and religion	The nature of science in real world contexts and multidisciplinary arenas	Ways of knowing and how they interact
UPPER PRIMARY	Science and religion are mostly concerned with different types of questions, including different types of why question.	Science begins with observations of the natural world and constructing ways to explain our observations. Some methods are more scientific than others.	Science has some similarities and some differences with other ways of knowing that we learn about in school.
LOWER SECONDARY	Today we ask big questions about human personhood and the nature of reality that bridge science and religion. Some people say that science and religion are compatible and some people say they are not.	Science informs our thinking about every aspect of our lives. Some questions are more amenable to science than others. There are some questions that science hasn't yet and may never be able to answer.	A school is a multidisciplinary arena. Different disciplines have different preferred questions, methods and norms of thought.
UPPER SECONDARY	Science and religion are not necessarily incompatible.	Scientism is not a necessary presupposition of science.	Some questions are more metaphysically sensitive than others.

Billingsley, B., Nassaji, M., Fraser, S., & Lawson, F. (2018). A Framework for Teaching Epistemic Insight in schools. *Research in Science Education*. https://doi.org/10.1007s11165-018-9788-6 (Open Access)

INTRODUCTION
WHY EPISTEMIC INSIGHT MATTERS

ABOUT THE EPISTEMIC INSIGHT INITIATIVE

What insights do we expect young people to call on when they address the big questions of life and the universe?

How can schools prepare young people for a world facing false facts and exaggerated headlines, and equip them with the best ideas and strategies to make informed decisions rationally and compassionately?

What strategies can schools use to develop young people's expressed curiosity about the nature of reality and human personhood, and give the future great minds of science and other disciplines the inspiration and stimulus they need?

Epistemic Insight is knowledge about knowledge – particularly knowledge about disciplines and how they interact. It is both a pedagogical approach and an intellectual virtue that is teachable & assessable.

Many primary schools have adopted cross curricular learning to develop student knowledge, skills and understanding through the interconnection of topics. Epistemic Insight moves beyond topic based or cross curricula work to emphasize the distinctive contribution each discipline makes in informing our thinking on the issue, and recognizing the similarities and differences.

By studying across subject boundaries students engage in a range of content that can simulate imagination and encourage active enquiry. Epistemic insight goes hand in hand with teaching a broad and balanced curriculum, it seeks to bridge subject boundaries; recognizing the distinctiveness of a discipline through its preferred methods, types of questions and norms of thought; whilst utilizing the 'purpose of study' of each national curriculum subject.

We live in an ever-evolving world, where we are constantly faced with a range of socio-economic challenges and increasing technological change. Epistemic insight is a meaningful and relevant approach that builds on current teaching practice where learning is planned, delivered and assessed through alignment to epistemic insight pedagogy. Highlighting the similarities and differences between disciplines within a multi-disciplinary arena.

Teachers can support students to answer these three questions.

- How does a discipline interpret the question?
- What methods would this discipline use to investigate the question?
- How would a scholar of this discipline know they had a good answer?

When students are able to do this, they are epistemically insightful. When talking to primary children we refer to this as **"thinking like a scholar"**.

THEORY OF CHANGE

The Epistemic Insight Initiative involves more than ten Higher Education Institutions across England, led by Canterbury Christ Church University, with funding from The Templeton World Charity, Uni Connect (formerly the National Collaborative Outreach Programme), All Saints Education Trust and a range of other funders supporting smaller focused aspects of the research.

We are working across Initial Teacher Education, and the Schools and College Engagement Team at the University and directly with schools, teachers and educators. This allows us to collaborate, co-create and develop research and practical classroom pedagogy and teaching tools that will develop and support students' expressed curiosity about Big Questions and understand how these can be used to capitalise on the curriculum intent.

Additionally, the work directly with schools and teachers is designed to provide opportunities for dialogue about questions that bridge subjects and disciplines and understand how this can work in a range of learning environments and across age groups.

By collaborating across age groups and subjects, we are researching ways to help students to progress towards a greater understanding of the nature of science, religion and the wider humanities and their relationships.

The work is helping schools to:

- Develop students' curiosity and capacity to express questions that bridge disciplines and subjects including Big Questions (those about the nature of reality and personhood that bridge science, religion, and the wider humanities).
- Support teachers to express the implicit curriculum and understand the shape of disciplinary knowledge across the curriculum so that this is shared with their students, who are then better equipped to understand disciplines in real world contexts.
- Explain the characteristics, potential and limitations of a range of disciplines and areas of knowledge. To show how they interact to inform our thinking about different types of questions and why the framing of questions matters.
- Develop (and evaluate) enquiries that demonstrate a growing ability to think more deeply, compassionately, and critically about Big Questions
- Equip students' to be independent, critical, and engaged scholars who have a rich understanding of the power and limitations of different disciplines to inform our thinking.

I can think like a scholar when I can...

- explain how different disciplines help me to investigate a Big Question
- explain what makes a question amenable to scientific enquiry

ACTIVITY 1: DEVELOPING KNOWLEDGE: A MULTI-DISCIPLINARY APPROACH

How is tea made?

Different disciplines address a question by drawing from their unique 'ways of knowing': different methods, norms of thought and types of questions.

Select two different disciplines to investigate this question and explain your rationale.

(you can use the discipline wheel on pp53-54 to support this)

For example:

- The mathematics of tea making
- The science of tea making
- The art of tea making
- Tea making in different geographical locations

ACTIVITY 1: REFLECTION

Why did you select your disciplines?

Was it because they contrasted? Do you have a greater familiarity or confidence with mathematics over art? Or did the science of tea making seem easier to explain than the mathematics?

Much of this selection process happens in the background of our curriculum and lesson planning, we may choose an experiment because it is trusted, cheaper, easier to explain (or any other number of reasons). But what students often perceive is that it is the ONLY way to investigate the topic.

How might other disciplines add to the investigation?

Look at the answers you gave. Do you think that they provide a FULL account of "how is tea made" or are you still missing details or important aspects? If you don't feel like you have a full explanation, we would say that the disciplines you have examined INFORM OUR THINKING about tea making but don't fully answer the question.

Providing students with this language can help students to understand and express the limitations of answering bigger questions using a single disciplinary lens. It can also be used to explore the concept that there are often smaller questions that can be fully answered within a single discipline – not every question is multidisciplinary!

What strengths and limitations can you outline for each discipline?

As we move through the sessions we will look in more detail at different ways of knowing. For now, consider your responses. We are going to focus on the strengths and limitations of the disciplines. Once you and your students are more confident, preferred methods, questions and norms of thought can be drawn into the discussion of strengths and limitations.

What aspects of tea making did the disciplines manage well and where did they struggle? Recognising the strengths and limitations can help students to see that knowledge from different disciplines helps them to build a richer understanding of the question they are answering. As well as becoming aware of when a small question can be fully answered within a single discipline.

SESSION 1
THE IMPORTANCE OF QUESTIONING

BECOMING MORE SCHOLARLY

WHAT DOES TEACHING EPISTEMIC INSIGHT LOOK LIKE?

The boxes below show some of the reasons and ways that we are proposing to help our students at school to become epistemically insightful.

Thinking like a scholar in KS1

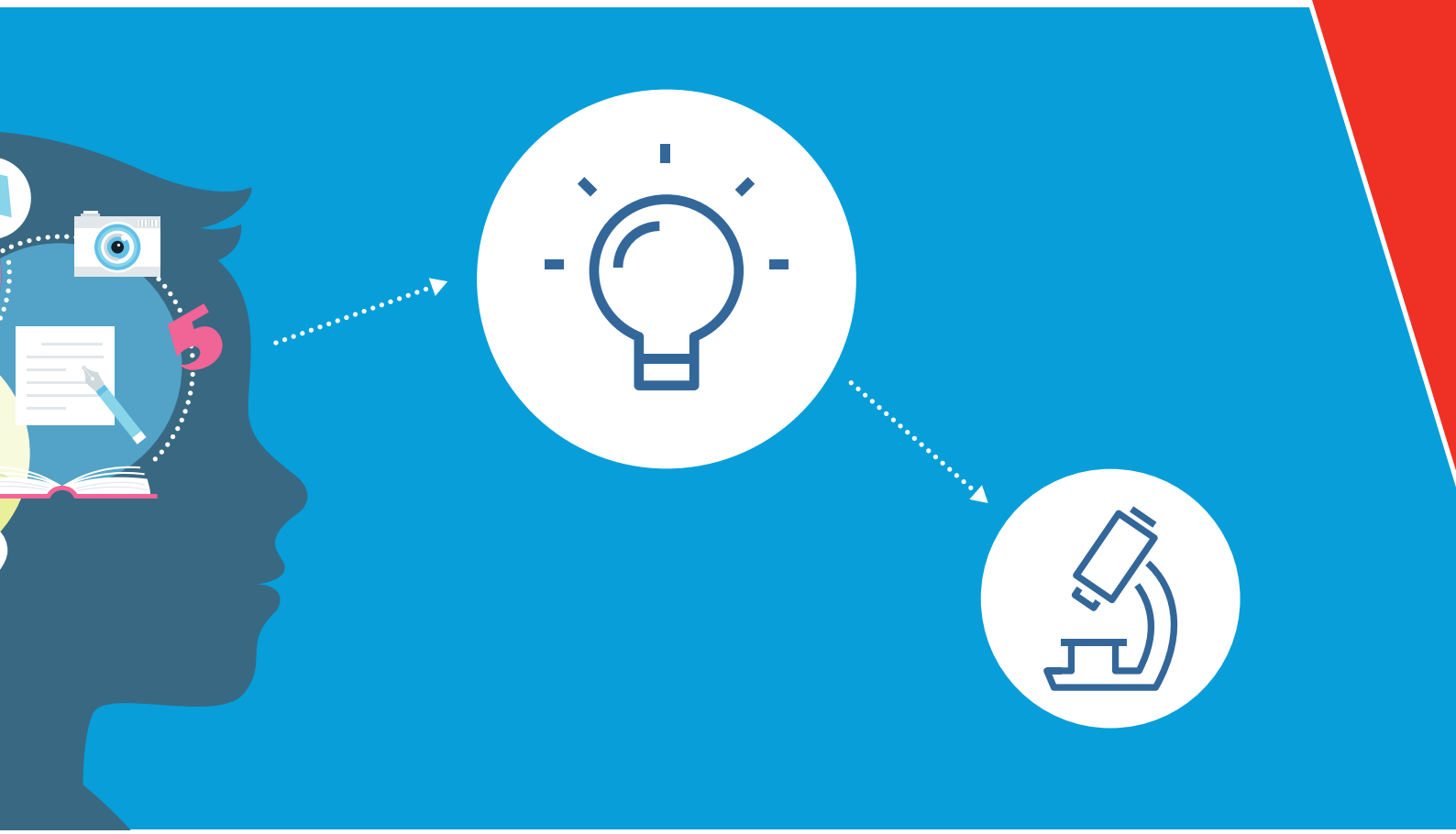
At school we learn about scholarly knowledge and how to think like a scientist, historian, geographer, musician…

Students sort books into their disciplines using the discipline wheel, they practise creating scholarly knowledge and research scholarly ways of finding out.

How scholarship works in KS2

At school we learn about questions that bridge two disciplines, like "Why did the Titanic sink". We learn that two disciplines can work together to give us a bigger picture – and what we miss if we miss one perspective out.

Students wise up to the complexities of developing knowledge within disciplines and across them by framing, investigating and analysing different types of questions. One day some of our students will be scholars themselves. Many others will also be in professions that produce or apply or test or examine or teach or write about knowledge.



Scholarly conundrums In KS3

At school we learn that each of the disciplines has its preferred questions, methods and norms of thought. Science seeks to explain phenomena in the natural world and is required to argue on the basis of observations that are objective and repeatable. That is both a strength and also a limitation. We see that different people find different types of questions interesting.

The idea that knowledge is limited is a hugely important epistemic insight. Some scientists use the phrase, sufficient truth, to explain that science can give us a high level of certainty within the boundary or frame in which we are working.

Scholarly thinking in KS4

We appreciate that scholars are likely to reach a consensus on some questions – like why does a pen fall to the ground. Some questions are more individual and contentious – like why people do what they do. We consider reasons why knowledge changes over time and also why the nature of science changes. Before vitamin tablets – there wasn't much call to work out whether too much of any one vitamin can cause you harm!

Students examine their own and other people's perspectives on the power and limitations of science.

FRAMING THE CHALLENGE

Educational research is focused on the question "How can we make education better?" The Epistemic Insight Initiative and curriculum framework are not intended to replace or compete with the National Curriculum, but instead to make the curriculum intent (and sometimes content) more explicit and visible for all our young people.

We know that topic-based work can sometimes leave students unclear about the distinctive contributions from different disciplines and lead to a focus on content not intent. For many students this relates to how they are "labelling" their learning experiences. We may plan engaging learning opportunities for our students but if they aren't either (a) clearly labelled or (b) we haven't equipped students to recognise that the methods they're using or the questions they're examining are associated with a particular discipline, then they may struggle to understand how their subjects relate to each other, but also to recognise that many of these curriculum subject boundaries are "fuzzy" in real world contexts.

SUBJECT COMPARTMENTALISATION

For many decades the practice at almost every level of education has been to teach students about scholarship and knowledge via a compartmentalized system of subject boxes. Even where students are taught through a topic based curriculum this is often run in contrast to distinct lessons in English and Mathematics, sending implicit messages about the value of the "other" subjects that don't get their own "box".

This entrenched compartmentalisation emphasizes subject boundaries without explaining links to other disciplines and developing understanding of the strengths and limitations of each discipline. This pedagogical engineering has constructed barriers to the development of epistemic insight and scholarly thinking and led to "gaps, confusions and misperceptions in students' reasoning" (Billingsley & Arias, 2017).

Epistemic Insight is about equipping students to be able to address these boundaries: Why are they there? What information can or should cross those boundaries and how does crossing the boundary change what that information/ knowledge/ vocabulary looks like?

DIGITAL "COLLAPSE" OF BOUNDARIES

In this 'digital' age, it is important to equip students, from early on in their education, to be rational and compassionate thinkers. By developing epistemic insight as well as mastery of content skills and knowledge, students are equipped to navigate their education and future career choices successfully. Through actively working to build their understanding of school as a multidisciplinary arena, we can equip them for the challenges and issues they will be addressing in their working lives which increasingly will not be tackled by one discipline in isolation.

There are incredible opportunities presented by online and blended learning, as well as opportunity for students to access a wealth of information to support their learning. However whilst we as adults may be aware of the need to carefully frame questions before entering them into an online search to retrieve relevant results, our ability to sort the information being received is based on our own implicit understanding of both the strengths and limitations of the disciplines and also the preferred questions, methods and norms of thought that shape the different disciplinary responses.

This is a different question to being able to recognise safe websites, "false facts" and valid online sources. The digital collapse of boundaries eliminates clear signposting of individual disciplines and their preferred questions, methods and norms of thought.

ACTIVITY 2: GOOGLE IT!
DIGITAL COLLAPSE OF BOUNDARIES

What is a footprint?

1. Undertake an internet search for the question. Apart from dictionary definitions How many disciplinary approaches can you find in the first 2-3 pages of results?
2. Choose 3 different interpretations or disciplinary approaches.

ACTIVITY 1: REFLECTION

What clues, cues or additional information did you use to recognise the disciplinary perspectives?

Consider how much of your ability to recognise the disciplines was based on your prior knowledge, either disciplinary such that you already knew digital footprints are associated with computing, or real-world context you have heard enough about carbon footprints to know they have broader contributing factors than science alone such as ability to pay more for local food to reduce air miles etc.

Think about how you can support your students to recognise similar clues. Whilst some of these may be visual a lot of them rely on our understanding of the methods or norms of thoughts associated with different disciplines and these aren't always clear to students.

Thinking about your students, how might they approach this same task?

There are two key issues to consider, the first is that there are a wide range of different "footprints" ecological, carbon, physical etc. these can offer opportunity to contrast interpretations. Secondly, it is possible to investigate different approaches to the same "kind" of footprint.

Footprints offer a really rich opportunity for examining different disciplines. These could include investigating how footprints are made (and how they can become fossils). For older year groups it might involve looking at the "footprints" poem, or footprints in art and thinking about what they symbolize. This doesn't have to be examined using a lot of text, you can get a similar breadth of results from an image search. Finally, you could choose to examine a multidisciplinary "footprint" such as ecological footprint and investigate how different disciplines could inform our thinking about what is needed to reduce our impact.

WHAT DOES THIS MEAN? AND WHERE DOES THIS FIT WITH THE CURRICULUM?

Understanding the difference between curriculum content and curriculum intent is an important part of epistemic insight for educators. Focus on the curriculum content can mean that we lose sight of the intention of the curriculum. The "purpose of study" can seem a long way from classroom practice, but it can also help students to understand why each discipline matters and how they relate (and in some cases overlap). How do we share this in an accessible way with students?

The science national curriculum provides an excellent example of how the intent can be missing from the content and lead to a lack of clarity for students.

asking simple questions and recognizing that they can be answered in different ways

asking relevant questions and using different types of scientific enquiries to answer them

asking their own questions about scientific phenomena

become aware of some of the big ideas underpinning scientific knowledge and understanding

develop understanding of the nature, processes and methods of science [...] that help them to answer scientific questions about the world around them

Note there is an implicit assumption – written into the purpose of study, but not captured in the content "all students 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, students should be encouraged to recognise the power of rational explanation" (NC). The missing step for students comes between KS1 and LKS2 – they need to be able to identify what makes a question relevant to (and answerable by) science.

ACTIVITY 3: GOOD QUESTIONS: HOW DO WE KNOW WHAT TO ASK?

The previous activity focused on recognising different disciplinary interpretations of the same question. This activity focuses on what makes different disciplines distinctive, and how we are able to recognise this.

Put each of these questions in the center of a Mind Map - and try to capture an answer or set of answers. Undertake this activity twice first thinking how you would answer this for yourself, then how you would answer this for a student in your class(es).

If you are undertaking this activity as a group, you may want to look at the questions in smaller groups or using a silent debate to challenge each others' assumptions.

1. What makes a question a good question for science to answer?
2. What makes a question a good question for geography to answer?
3. What makes a question a good question for history to answer?

I can think like a scholar when I can...

- Explain how different disciplines investigate a question
- illustrate ways in which disciplines are similar or different

ACTIVITY 3: REFLECTION

What is your focus for each discipline?

Have you focused on curriculum content - Emphasizing the "kinds" of things that each discipline deals with? Have you looked at methods – how the disciplines arrive at their answers? Or have you posed questions that the discipline could answer?

These are all common responses to this activity, and it can be difficult, even as teachers and educators to precisely think about what makes something a good question for a discipline. The content is the "easy win" but it doesn't tell us what makes it a good question for the discipline. This returns to the "purpose of study" and the need to capture what is distinctive about each discipline (although this may also include questions, methods and norms of thought examined next). The clearest explanation is to focus on the norms of thought (or what each discipline values).

Looking for relevant questions?

Many people find this activity difficult, even though we are educators and understand what is grouped in to a curriculum subject. This highlights the importance of supporting students to understand what makes a question relevant.

Think about what this might look like with your students, and how this activity can be used to explore what links the questions or ideas (this can be done be encouraging the students to explore common themes if they come up with lots of content questions). For example, we might be tempted to say that geography deals with "questions abut the world". Consider this "why is the world here?" is not a good question for geography to answer – why is that, and what disciplines may be better placed to inform our thinking about this question?

Thinking About Student Responses

When you answered this from your students' perspective did you come up with different answers? Do you think they are picking up on the implicit curriculum intent? Would they find it easier to answer for a discipline like science or something else?

The aim of this, when explored with students is to encourage discussion. Content retrieval can be praised, and then they can be supported to "think like a scholar" by exploring what links the different content topics. Particularly with science, students may already recognise the method, and this can be used to support exploration of preferred questions and norms of thought, or to act as a starting contrast to think about another discipline.

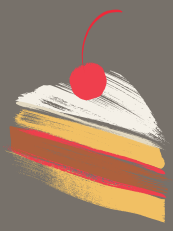
SESSION 2
WAYS TO TEACH EPISTEMIC INSIGHT

DISTINCTION BETWEEN SUBJECTS AND DISCIPLINES

This session focuses on developing your understanding of what this looks like in practical terms in a school classroom, how it sits alongside the requirements of the national curriculum and introduces some simple tools that be brought in to any of your teaching.

Teaching epistemic insight includes teaching students how to work with questions that are framed and explored by one discipline as well as those that are multidisciplinary. Multidisciplinary questions include Big Questions that touch on the nature of reality and human personhood, but they also include questions that bridge only two or three disciplines.

Epistemic Insight focuses on disciplines, not subjects, this is important because whilst students are used to working in subjects, subjects only exist in schools and colleges. They have been engineered to deliver key aspects of a discipline that provides a firm foundation, or what is perceived to be pertinent content. This selection of material means that sometimes the subject studied at school can look very different to the discipline out in a real-world context. The subject can be thought of a small slice of the disciplinary cake.



Subjects also have been designed to have quite clear boundaries, whilst the water cycle may appear in both science and geography, in general curriculum subjects don't echo the woolier boundaries between some disciplines. However, the apparent firm boundaries between subjects enable misconceptions about how disciplines inform our thinking, as well as their strengths and limitations.

I can think like a scholar when I can...

- explain how a discipline's preferred methods may influence the answer it provides
- illustrate how another discipline is diferent to science

DEVELOPING QUESTIONS

Disciplines have preferred methods, questions and norms of thought. These can be captured through the three questions below. The most difficult to explain can be the norms of thought. This can be explained to students by saying that different scholars have different things that they value in their discipline. This helps them to know if they have arrived at a good answer. For example, a "history" answer that focused on current events wouldn't be dealing with what history values (people and events in the past).

If students are able to answer these three questions, they have a good understanding of what a discipline is. Students who are able to answer the "thinking like a scholar" statements, and the poster statements on p55, will also have a good understanding of disciplinary knowledge.

How does my/this discipline understand the question?
(Questions)

How does my/this discipline investigate the question?
(Methods)

How would my/this discipline know it has a good answer?
(Norms of Thought)

How can I make a better answer?

BIG QUESTIONS AND BRIDGING QUESTIONS

Both Big and Bridging questions provoke multidisciplinary responses, however there are significant differences between the two. Because of the nature of Big Questions they are often questions that science, religion and other disciplines have something to say. However, they are also questions that whilst they may be informed by multiple disciplines, we are unable to arrive at either a definite answer or a consensus – for example "What does it mean to be a person?" or "why is the world here rather than nothing at all?". Students often express their curiosity about these questions and discussion of them can form an excellent part of an epistemically insightful classroom and allow students to examine a whole range of issues that arise where science and religion meet.

Big questions can be broken down in to smaller questions that are more amenable to different disciplines and where we may be able to arrive at definite answers to inform our thinking about the Big Question.

These questions may also deal with issues that are more sensitive for some students due to the science and religion links. Due to the nature of Big Questions it can be difficult for students to clearly understand how the methods, questions and norms of thought of different disciplines discretely inform our response (it may feel like there is a lot of overlap).

Bridging Questions are pedagogically engineered to highlight the similarities or differences of how (usually two) key disciplines interpret or investigate a question.

They are designed to act as a teaching tool and whilst a Big Question may be used, bridging questions don't have to touch on the ultimate nature of reality or personhood and so can be started in any curriculum subject.

EXPLAINING DISCIPLINES IN THE CLASSROOM

Linking disciplines to scholars e.g. historian, scientist etc. can help students to understand that what they do in the world, might be very different to what the subject looks like in school. However, it is important to be careful as students progress that they don't conflate disciplines and careers. Using Bridging Questions to frame students' enquiry provides a useful tool to also develop their understanding of different ways of knowing across disciplines as it it enables them to practically investigate how their answers differ depending on the disciplinary lens they are using. This can be achieved by students exploring both approaches together as a whole class, or by different groups in the class exploring different disciplinary approaches (this could include multiple groups exploring 2 disciplines) and then coming together to explore the different answers that they have arrived at.

FRAMING BRIDGING QUESTIONS

Bridging questions can be designed to show how different disciplines apply contrasting norms of thought (values) to answer the same question.

For Example: **What is Life?**

Science values an objective and repeatable answer – this leads us a biological response in MRS NERG and an account that applies to all living things

Theology (RS) values answers that refer to purpose and meaning – this (along with other humanities responses) provides a much more diverse response that looks at meaning, creation, values, relationships etc.

Both science and theology are able to inform our thinking about this question with their norms of thought providing different disciplinary perspectives.

I can think like a scholar when I can...

- give an example of two disciplines that have similar preferred methods
- explain how a multidisciplinary approach to questions can be helpful

Bridging questions can also be used to compare how different disciplines interpret the same question (which may include breaking it down in to smaller questions for each discipline).

For Example: **Why did the Titanic Sink?**

Science answers the smaller question "what **caused** the Titanic to sink?" The answer focuses on questions about materials, floating and sinking, density etc. These can all be investigated through experiments using observations.

History answers the smaller question "who was to **blame** for the Titanic sinking?" The answer focuses on the roles of different people on board the Titanic but can also include those who were building the ship etc. These are investigated by looking at a range of sources and thinking about the bias' and purpose of diary entries, newspaper reports etc.

This approach helps students explore the preferred questions and methods of different disciplines. The table below compares science and history for "Why did the Titanic sink?"

	SCIENCE	HISTORY
Preferred questions	Asks questions which investigate the nature of the world around us e.g. What caused the titanic to sink?	Asks questions about people and events from the past e.g. Who was to blame for the Titanic sinking?
Methods	Investigate through observation. Undertake measurements to test a hypothesis. Seek repeatability where possible	Investigate through examining sources (physical objects or written, audio or video accounts) Select and organise relevant information from a range of sources Seek an accurate account as far as possible (this is harder the further back we go)
Norms of thought	There is a consensus about the results Results allow us to make accurate predictions about the behaviour of objects in the natural world. Results are objective	Different sources need to be checked for bias and motive. Results allow us to understand what happened in the past and may inform our thinking about events in the present/future Results are subject to interpretation
Note: This is not an exhaustive list, the aim is not to capture everything that is distinctive or similar between disciplines but to capture how students can recognise (without looking at the timetable/ title of the book) the kind of scholarly thinking they will be expecting to undertake.		

ACTIVITY 4: DISCIPLINARY APPROACHES TO THE SAME QUESTION

Why do we have rainbows?

Look at the two ways in which bridging questions can be used.

Think about how you could use this bridging question to explore either the norms of thought or preferred questions and methods for two disciplines.

You may want to consider what this would look like in class, and what initial responses you might get from your students before you introduce the disciplinary lenses.

The discipline wheel (pp53-54) and bubble tool (p52) might be useful to inform your thinking.

ACTIVITY 4: REFLECTION

Which approach did you use to the question?

Different norms of thought:
Science leads us to an objective and repeatable answer focusing on light and refraction.
Theology leads us to an answer about meaning looking at God's promise to Noah

Different Questions / Different Methods
Art might ask a smaller question of "how can we make a rainbow?" or "what do rainbows symbolize?"
English might ask a smaller question of "how have we used rainbows in writing?"

When we need to break down the bigger question in to smaller questions for a discipline you often find that this doesn't provide a full answer. Because we have asked small questions that fit inside a discipline they often miss out some aspects, for example the smaller questions for English and Art don't include how rainbows are made or the idea of God's promise even though they look at other questions about rainbows as symbols.

Could other disciplines contribute to your answer?

Looking again what other disciplines could you use to answer this question? And which disciplines do you think your students would draw on? (How) would these responses change if the bridging question was "What do rainbows mean?".

Rather than providing the bridging question you could also start with the bubble tool and ask students to write down all their questions about rainbows thinking about how amenable they are to science. One of these questions could then be used as a bridging question, or two could be uses to explored how different disciplines might be best placed to answer them because of their preferred norms of thought.

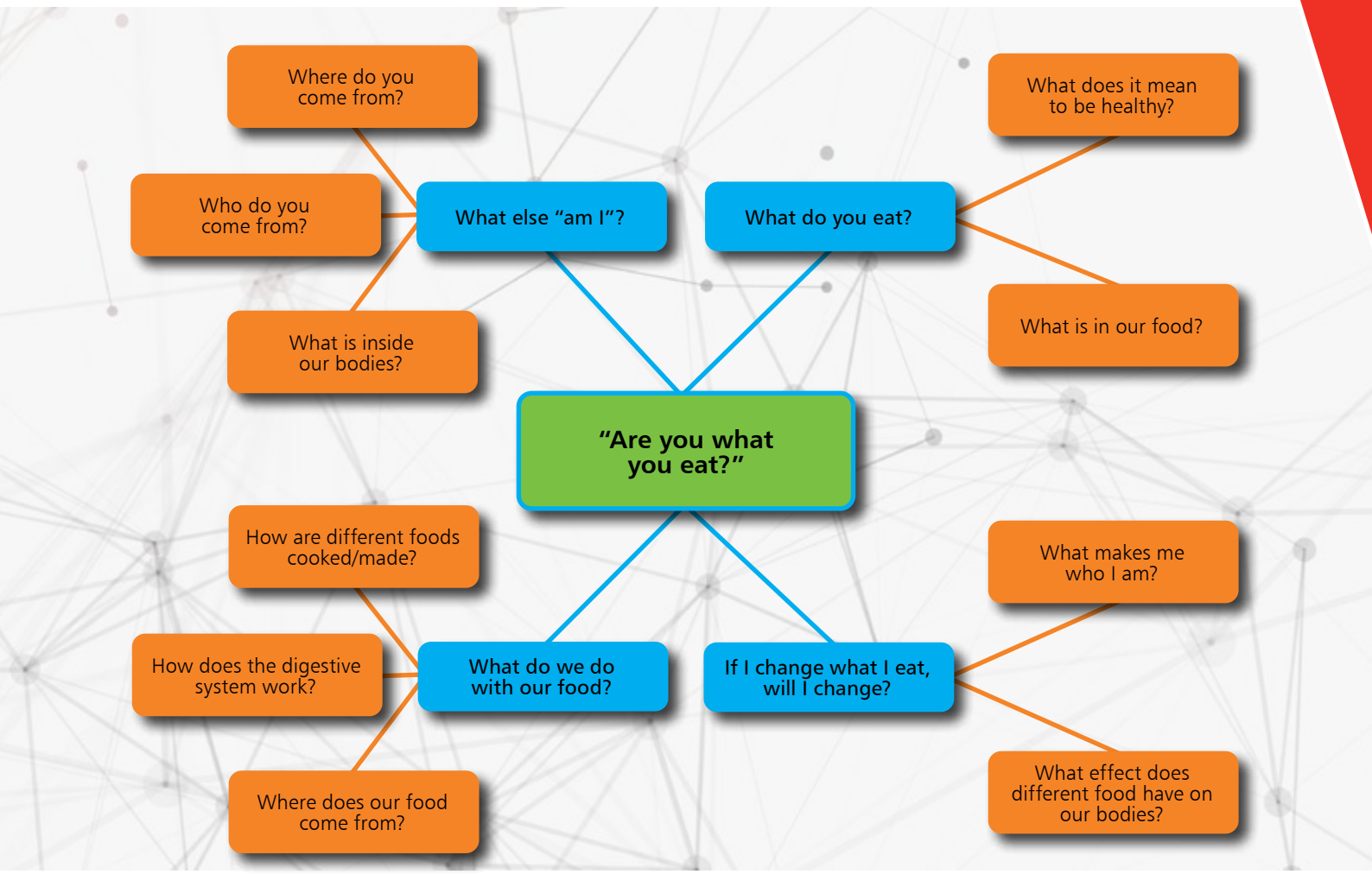
Thinking like a scholar

Looking at the thinking like a scholar poster on p55 you can see that bridging questions can form a key role in supporting students to develop their epistemic insight and recognise the distinctiveness and interaction between different disciplines. This doesn't mean that all lessons need to be focused around bridging questions, but building the language of scholarly thinking into the wider learning can help overcome some of those challenges caused by subject compartmentalisation.

This does not mean you need to re-plan all the lessons, it can be as simple as introducing an opening question to your lessons. "We are now going to be doing history, when we are thinking like historians… we investigate by/ ask questions about/ want answers that…" This can also be used to compare to the previous lesson when they were thinking like scientists (for example).

USING LEARNING WALLS

Learning walls provide an excellent opportunity for students to express their curiosity around a Big or Bridging question whilst also providing a visual reminder to students of the preferred questions, methods and norms of thought for different disciplines. The questions can then be explored in lessons (where they link to the curriculum) or during circle time and other opportunities such as PSHCE.



Here questions are linked by smaller questions this means that the questions are re-compartmentalised in to their subject silos and allow further opportunities for students to explore the idea that "Science has some similarities and some differences with other ways of knowing". The central Big Question would sit on the largest bubble on the bubble tool as there are **smaller questions that science can answer.** The next layer of questions would sit in the middle bubble – each of these has at least one question that can answered by science and therefore is **partly amenable to science.** Finally, in the outer layer of questions there are questions that are **very amenable to science.** Within the classroom the three layers of the bubble tool could be identified on the learning wall with three different coloured stickers. This can be supported by conversation about what colour new questions should be.

Note that not all the "orange" questions can be answered within a single discipline or by science this isn't about creating a hierarchy of questions where science has "truth" and other disciplines have "opinion". They are defined by their preferred methods and norms of thought. Through this work students will be supported to recognise that Science begins with observations of the natural world and constructing ways to explain our observations, and that some methods are more scientific than others.

SESSION 3
DEVELOPING AN EPISTEMICALLY INSIGHTFUL LESSON

BRINGING EPISTEMIC INSIGHT TO YOUR CLASSROOM

So far the focus has been on teaching and learning strategies, however this session will examine the practicalities of planning epistemically insightful learning experiences for your students.

We will take you through a worked example using the bridging question "Why did the Titanic Sink?" This focuses on the "nature of Science in real-world contexts and multidisciplinary areas" similar approaches can be used for "different ways of knowing and how they interact" (usually when one of the disciplines isn't science), and for "relationships between science and religion".

Using the same bridging question we will share ideas on how you can design:

- A stand-alone lesson
- A series of lessons using different disciplinary lenses
- A multidisciplinary project
- Embedding epistemic insight language across your current teaching practice.

In all of these opportunities there is a focus on highlighting the distinctiveness of different disciplines and how they interact with other disciplines. This includes highlighting where disciplines are similar to each other. Developing students' epistemic insight includes supporting them to develop their understanding of methods within disciplines and how to frame questions for a specific discipline both skills are highlighted within the Primary National Curriculum.

The "Why did the Titanic Sink?" workshop is regularly delivered as a single session However, in this worked example it is being planned to be delivered as two lessons (one in history, one in science). The example 5-minute lesson plan (on pp34-35) will be used to guide the process.

THE PLANNING PROCESS CONSISTS OF 3 STEPS

1

Building on current practice

This includes the design of the Big or Bridging Questions, looking at content links across the curriculum, and how this maps on to current delivery opportunities.

2

Developing students' epistemic insight

This asks you to consider how students will be supported to answer the three key questions of:

- **How does my/this discipline understand the question?** (Questions)
- **How does my/this discipline investigate the question?** (Methods)
- **How would my/this discipline know it has a good answer?** (Norms of Thought)

This ensures that students are developing their understanding of both disciplinary knowledge (knowledge about disciplines) and substantive knowledge (knowledge produced by a discipline). This avoids the risk of students only "seeing" the topic and not the disciplines.

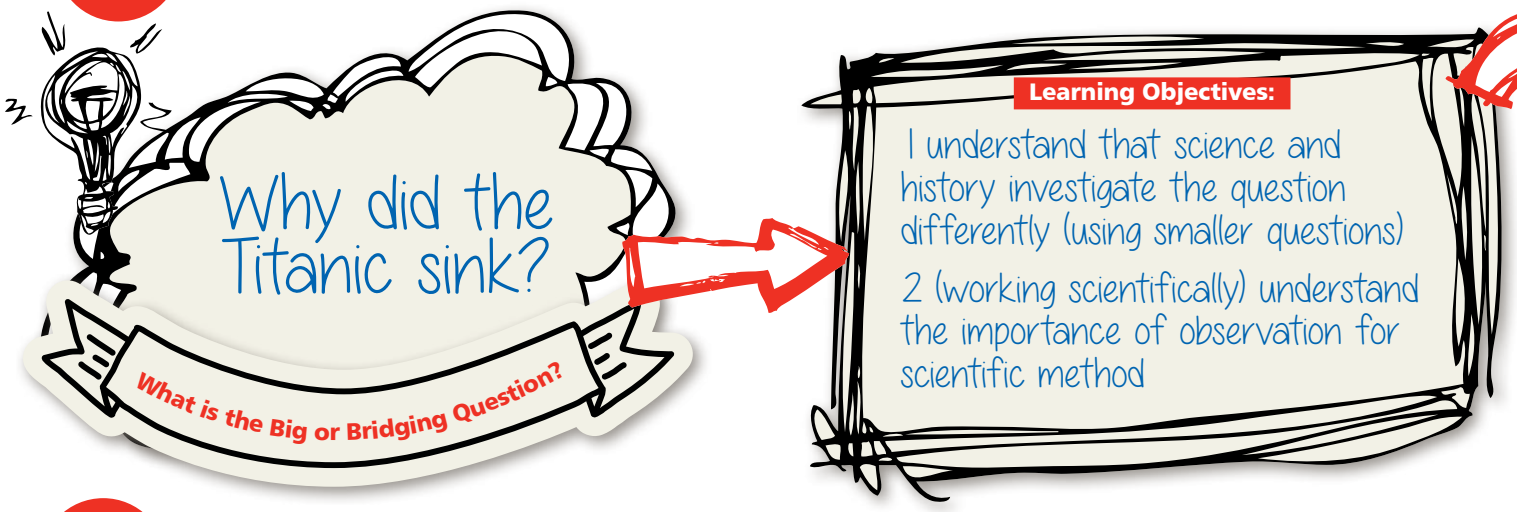
3

Building permeable "classroom" (lesson) walls to make links across the curriculum

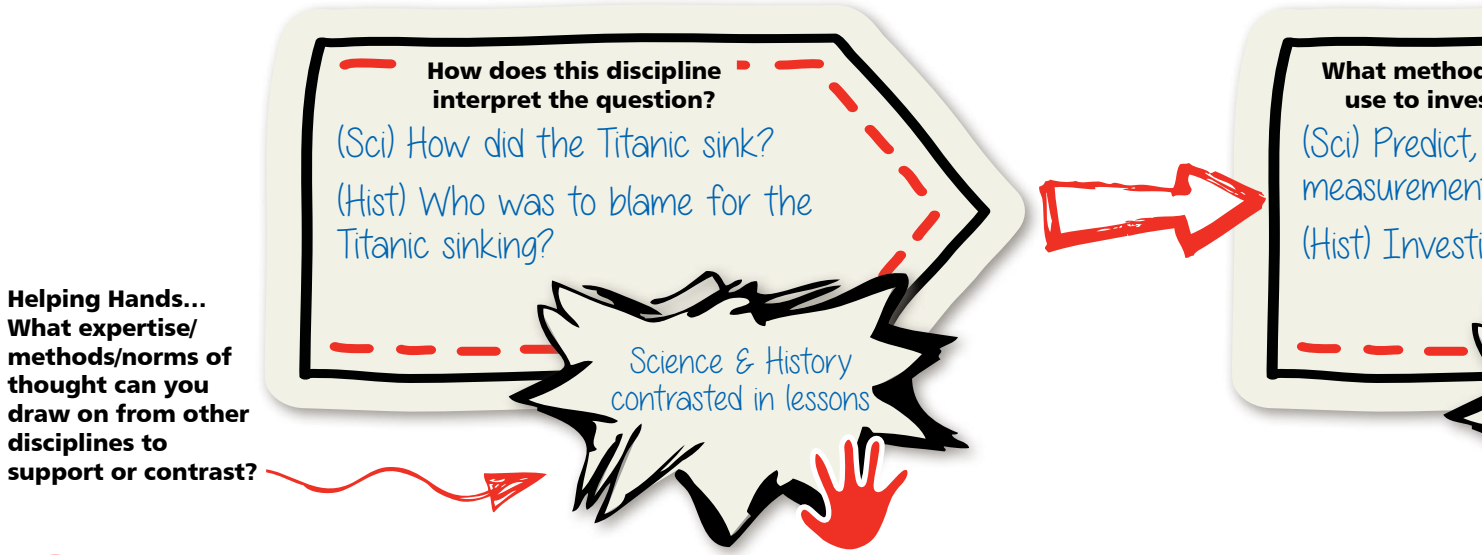
This includes thinking about the wider misperceptions that can be addressed (such the idea that science can answer every question – uncritical scientism), or if this is being designed to address a particular boundary (such as the one between science and religion). Finally thinking about how the epistemic insight and learning can be embedded by delivery in multiple lessons, or through bridging two disciplines in a single lesson etc.

5 minute lesson plan - bridging subject boundaries

1 Building on Current Practice

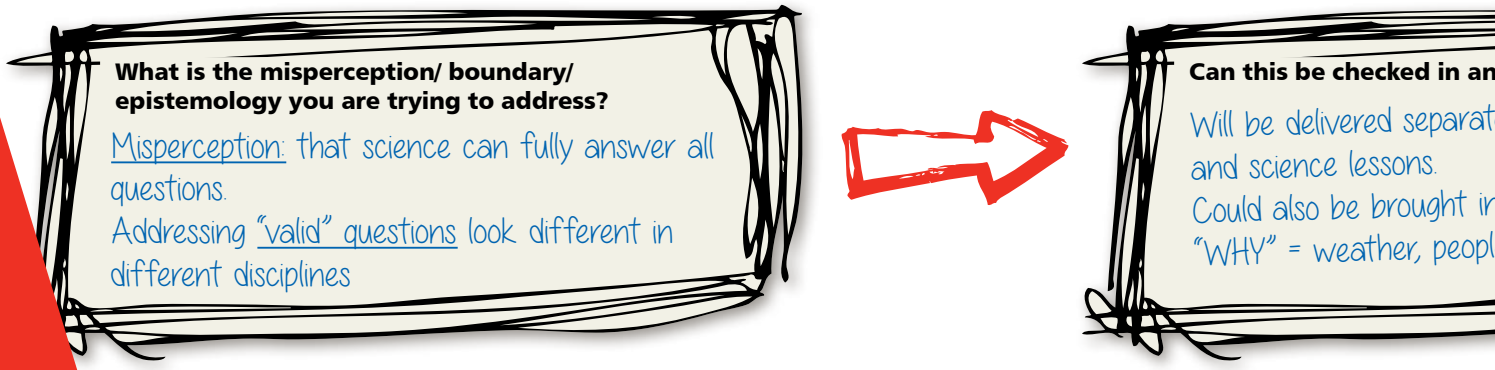


2 Developing Epistemic Insight: How can the students be s



Helping Hands... What expertise/ methods/norms of thought can you draw on from other disciplines to support or contrast?

3 Building Permeable Classroom Walls: Forming links acros



Before they investigate, what Do they already need to know?

Building on:

- existing knowledge of scientific process.
- understanding of evidence in history

Is this building on existing knowledge? Challenging misperceptions? Acting as extension?

How does this map on to other areas of the school curriculum?

Comparing scientific method with "methods of historical enquiry"

Devising "historically valid questions"

Planning different kinds of scientific investigation to answer questions

upported to answer these three questions?

ds would this discipline stigate the question?

Test, Observe, Taking ts

gating different sources

How would (someone in) this discipline know they had a good answer?

(Sci) about Nature of the world; (incl properties of materials & forces)

(Hist) about people & events in past

s the curriculum

other classroom?

ely across history

to geography e & places

Will the session(s) be co-taught? Taught separately across subjects? Draw on knowledge from other subjects

Planned to be delivered in 2 subjects. Could also be 1 afternoon lesson.

1 BUILDING ON CURRENT PRACTICE

Choosing whether to tackle a Bridging or a Big question is dependent on two things:

1. Is the session being delivered over only one or two lessons?
2. What are your learning objectives?

If a question is going to be examined over only one or two lessons, the best way to ensure that students are clear about the contributions each discipline makes is to focus on a tightly defined bridging question that is either able to show how different disciplines interpret or investigate the question (preferred questions and methods) or how they apply different values to answer the same question.

Here the Bridging Question "Why did the Titanic sink?" is used to examine preferred questions and methods. This links to the learning objectives with a focus on scientific method, and wider curriculum aims in science and history around framing "valid" or "relevant" questions.

Deliver it differently: Series of Lessons or Multidisciplinary Project

Big Questions are better suited to a longer time frame for investigation. In shorter sessions with so many disciplines able to inform our thinking it can feel like a topic where everyone has something to say. When this is being examined over a greater number of sessions it is possible to dedicate sessions or groups to exploring particular disciplinary lenses to the question that can then be brought in to comparison and contrast.

Learning Objectives:

I understand that science and history investigate the question differently (using smaller questions)

2 (working scientifically) understand the importance of observation for scientific method

The Framework statements (and the corresponding "Thinking Like a Scholar" statements) are all drawn from the National Curriculum. Therefore, these may form a focus of your lesson(s) as is the case for this session. Equally "Thinking Like a Scholar" may be embedded within your classroom practice and therefore LOs may be more content driven because you know the epistemic insight will be included.

Note: within the LOs the methods and preferred questions have been combined. This is fine from a planning perspective. But make sure that students recognise that reframing questions is about preferred questions (and often norms of thought). Methods to investigate those reframed questions may be very similar.

Links to wider curriculum: There is a strong link between the LOs and the mapping to other areas of the curriculum. However when delivered within a single lesson there isn't the opportunity for students to devise the questions, or investigations and so this has to be more teacher led with the focus on students developing awareness of the different methods, and the language to confidently talk about preferred questions.

I can think like a scholar when I can...

- science and history have different preferred methods and norms of thought
- give an example of how science can inform my think about a big or multidisciplinary question

This section asks you to think about both content knowledge that they need to engage with the bridging questions and the wider epistemic knowledge and skills they need to engage. This may include information attached to cultural capital etc. For example, we have found that whilst many Key Stage 2 students are aware of the Titanic, this is in relation to the film, and they are not necessarily aware that it was a historical event. In this example the lesson equips students with the knowledge and language associated with the two disciplines.

These examples are taken from a version that examined the question using Engineering as the disciplinary lens. At the end of this session, after investigating as history scholars, students are asked to consider if their "unsinkable" ship can account for the actions of the people.

This provides an incredibly clear example of how far science can inform our thinking and work but that it cannot include everything. Because it is unsinkable "in the lab" doesn't mean that it still will be if people use it inappropriately/steer too late etc.

USING THE TOOLKIT

The discipline wheel or bubble tool can be used as a starter to assess the extent to which they think this is a multidisciplinary question and/or amenable to science.

How does this map on to other areas of the school curriculum?

Comparing scientific method with "methods of historical enquiry"

Devising "historically valid questions"

Planning different kinds of scientificinvestigation to answer questions

There is a clear connection between these National Curriculum objectives and the Epistemic Insight Framework and "Thinking like a scholar".

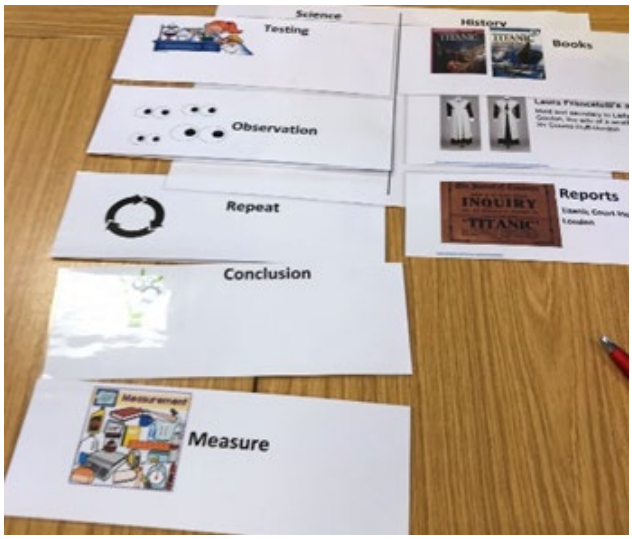
Within the single lesson the different methods of enquiry are explicitly addressed although there isn't the space for students to devise their own questions or investigation.

The comparison of methods is addressed and assessed within the plenary card sort activity where they sort the methods and data sources according to discipline in small groups or individually.

A set of discipline sort cards is issued to group. Students are to match the methods with the appropriate discipline. Some methods may not fit just into one discipline e.g. Conclusions/analysis would fit into both science and history.

These are brought together through a class discussion allowing students to justify their responses (for example if a student thinks measurement should be included in history because of measuring the wreckage).

This allows students to develop their knowledge of key terms within a discipline and compare the use of the terms cross disciplines where it is informed by methods, and norms of thought.



Deliver it Differently: Series of Lessons or Multidisciplinary Project

Particularly when delivering over multiple sessions it is possible to allow space for the students to produce the smaller questions, devise the investigations, or establish what sources they may want to use.

Things to Think About

What (if any) are the similarities or differences in the evidence? Is the evidence acceptable because of the methods used?

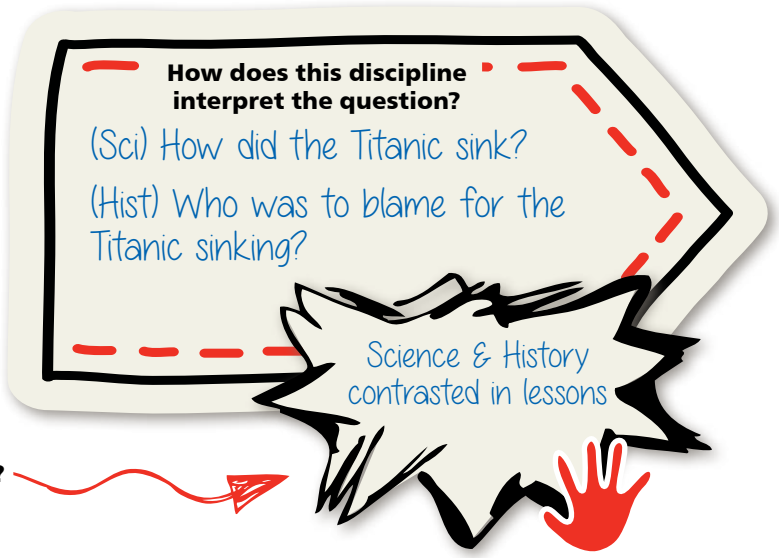
Does the evidence provide a good answer? How could the answer be improved? (limitations)

How amenable to science are these questions? (UKS2)

Thinking about the preferred methods and norms of thought supports students to engage with the curriculum objectives of valid and relevant questions. This also supports students to challenge the disciplinary use of language and how due to the norms of thought (values) of different disciplines this means that shared language is applied and interpreted differently because of what is valued. E.g. A postcard from the Titanic wouldn't be evidence in science but it's excellent evidence in History.

2 DEVELOPING EPISTEMIC INSIGHT

Even where the LOs are content driven it is fundamental that students leave the lesson(s) able to answer at least one of these questions (framed age appropriately). As designed this lesson supports students to answer all three. However, you may choose to focus on one or two within a single lesson, to ensure that they have the higher level thinking necessary to recognise knowledge formation within a discipline and the relationships between disciplines.



Helping Hands... What expertise/ methods/norms of thought can you draw on from other disciplines to support or contrast?

As observed earlier not all big or bridging questions will be interpreted differently by different disciplines. The "interpretation" can be understood as asking if the questions needs to be reworded to make the *implicit* preferred questions and norms of thought *explicit.* This is done by framing the bridging question in to smaller questions (where necessary) that are very amenable to the disciplines in discussion.

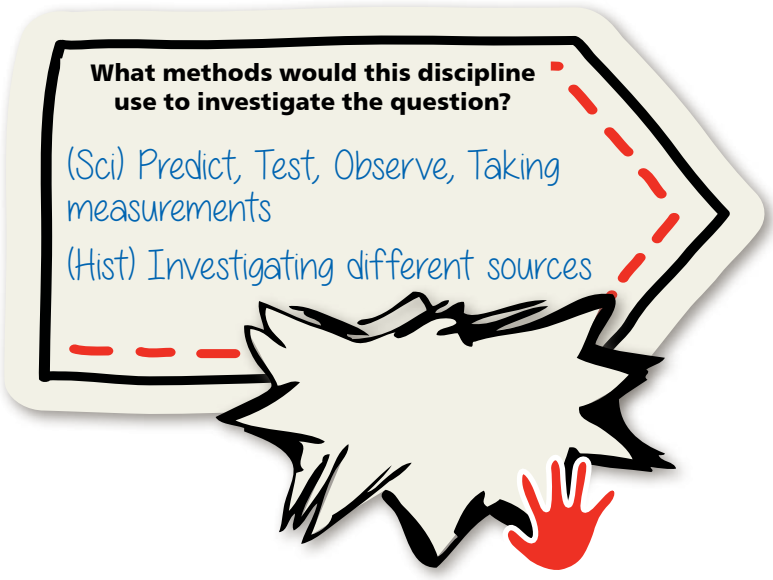
Where disciplines interpret the question in the same way (such as "what is life?") the norms of thought of the chosen disciplines (and others) will take on greater significance to inform our response.

Deliver it Differently: Series of Lessons or Multidisciplinary Project

Particularly when delivering over multiple sessions draw on the expertise of other disciplines to inform thinking (including wider curriculum links).

Make sure you link back (or forwards) to the other disciplinary perspectives you will be examining.

If examining through engineering or technology – this in inherently multidisciplinary as it looks for the practical application – could other systems be used to mitigate human carelessness (e.g. " ship airbags"?).



In this single lesson the session is divided in half with scientific method being examined first to allow to clear comparison with history to be made. When being explored within an engineering context the front loading of the scientific method allows the history to be used to challenge uncritical scientism (that science is able to fully answer all questions) and to introduce students to limitations of some experimental results when placed in less controlled real-world contexts.

SCIENTIFIC METHOD

BBC bitesize has resources on how the Titanic was built and the materials that were used, as well as information on how large ships float and the engineering behind the build. These can provide good starter activities and support delivery.

Students undertake a hands-on investigation to understand how the Titanic sank and how the compartments were supposed to make the Titanic "unsinkable".

Students (in groups) are provided with handmade or purchased "Titanic" models, bowls of water and a jug. (portioned drawers organisers work well and cost approx. £2 a boat **https://tinyurl.com/titanicmodel** the dimensions mean that you have to nearly completely fill the boat for it to sink).

Students are asked to **predict** what will happen as the compartments are filled one by one (they may also predict how many will be needed to sink the ship). To compare the effect of the compartments, students can time how long (or measure the amount of water) it takes to sink if the water is divided evenly through the compartments (replicating what would happen without compartments).

Students to **observe** and **test** what happens as each compartment is flooded and at what point it will sink? Why does it sink? This can also include a discussion around materials and their properties (15mm marbles, metal bearings, wooden and polystyrene balls be used to explore density with UKS2)

Note 'observation' as a scientific method
www.bbc.co.uk/bitesize/topics/zhnkjhv/articles/zfcdqhv

HISTORICAL METHOD

The History Channel has bite-sized statements of some of the causes that can be adapted for prompts **https://tinyurl.com/history-titanic**

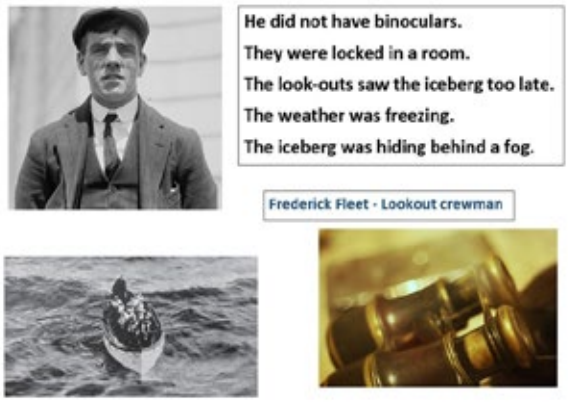
BBC bitesize have a 2 minute "news report" and a short animation of Eva who survived **www.bbc.co.uk/programmes/p029z97h**. These provide a clear shift from the objective, repeatable observations they have undertaken using a scientific lens to the people and events focus of history.

Using a range of historical sources and artifacts (e.g. Dock Master's logbook and fire report, newspapers, survivor accounts) students examine what knowledge we gain from different kinds of evidence in history. (The Titanic Enquiry Project provides digital resources on the inquiries in to the disaster these can be adapted for students; the Eva animation could also be used **www.titanicinquiry.org**)

Issue each group of students a set of character cards (UKS2 available at **www.epistemicinsight.com/titanic-and-other-resources** LKS2 available via email).

Each student takes turns in presenting their character (this could include role play). Students decide based on the evidence they have who was to blame. In groups or as a whole class they examine if it is the fault of one individual or one event or a series of factors (described as an event cascade)? Was no one person or event to blame?

*Note the **range of evidence**. Discuss the **purpose** of the documents and whether there was any **bias** in the reporting. How do the **lack of consensus and types of evidence**, compare to the evidence from the scientific investigation?*



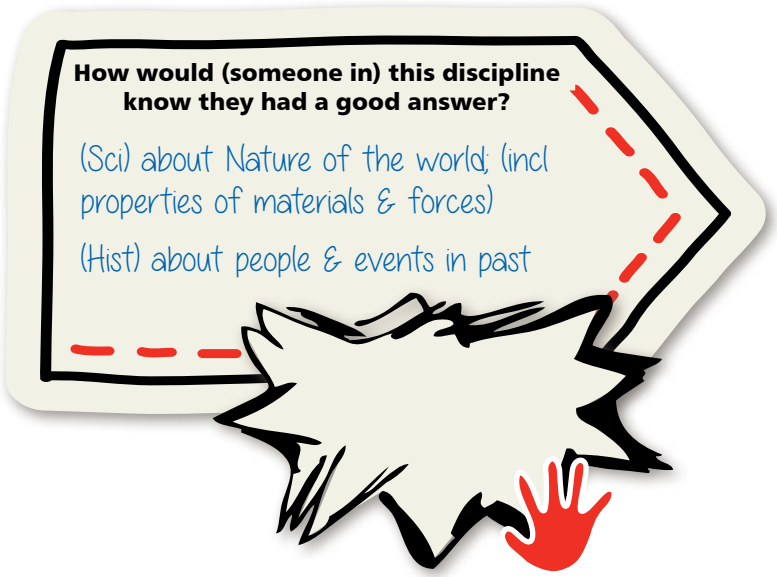
Deliver it Differently: A Lesson on Methods

Exploring different methods can form a lesson in isolation. In conjunction with the Discipline Wheel students could be asked to think about the different methods each discipline would use to investigate a question.

Combined with an adapted Bubble Tool, students could be asked to sort different methods to answer a single question, or more generally sort "different ways we find out about the world".

The different norms of thought are brought together during the plenary where students compare the two answers they have arrived at.

Attention is drawn to the fact that the answers in the first part of the lesson focused on observations of the world. They arrived at answers that could be replicated and were objective.



The responses from the second part of the session focused on the people, timelines (and the order of events) this response is good for history because it is about people and events in the past, but would not be a good answer to a scientific investigation.

As extension students can examine whether the "event" of the sinking of the Titanic is fully answered by science because we are not able to replicate the event itself. The models weren't made of metal and wood, neither were they damaged when they sunk (this could be examined further by using resources like the CGI of the Titanic sinking **https://titanicfacts.net/how-did-the-titanic-sink/**)

USING THE TOOLKIT

The discipline wheel can be used to support students to think about the norms of thought (values) that helps them to know the arrived at a "good" answer. It can also be used to encourage students to think about different disciplinary approaches to the question – e.g. geography.

ACTIVITY 5
BRIDGING QUESTION FOR SCIENCE AND HISTORY

Having now seen a worked example for science and history, think for yourself (or as a group) what a similar single session might look like for this bridging question on the great fire of London. Use the table below to think about how the spread of the fire due to close buildings and the materials used could be modelled in a practical activity.

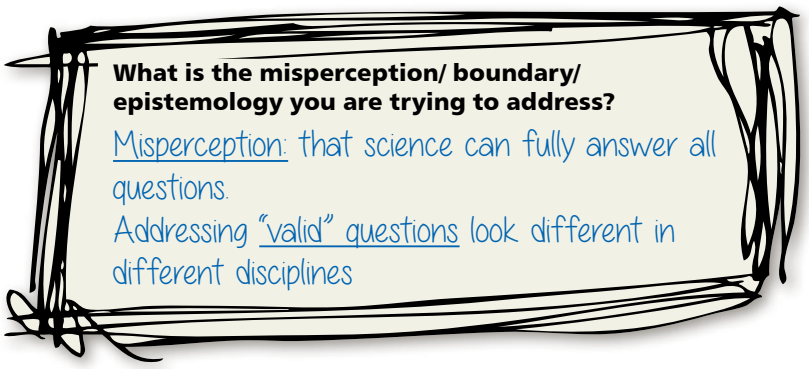
<table>
<tr><th colspan="4">Bridging Question: Why did the fire of London spread so quickly?</th></tr>
<tr><td colspan="2">Being a science scholar</td><td colspan="2">Being a history scholar</td></tr>
<tr><td colspan="2">Preferred question:</td><td colspan="2">Preferred question:</td></tr>
<tr><td colspan="2">Informed by:
Practical science experiment</td><td colspan="2">Informed by:
Investigation of the events and people</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Methods</td><td>Norms of thought</td><td>Methods</td><td>Norms of thought</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

I can think like a scholar when I can...

- Explain how different disciplines investigate a question
- Illustrate how another discipline is diferent to science

3 BUILDING PERMEABLE CLASSROOM WALLS

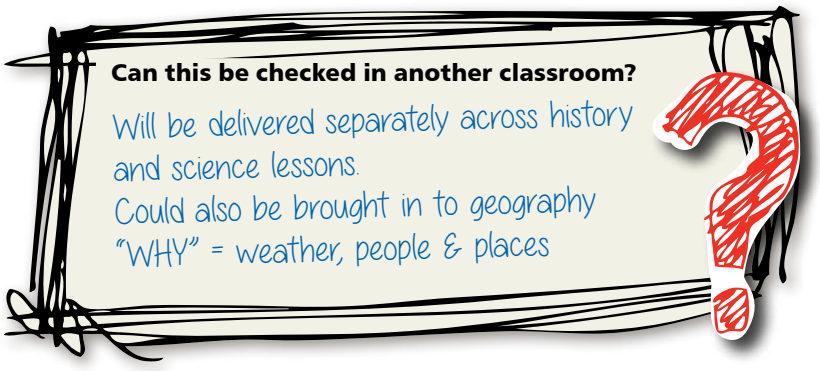
The final section of the lesson plan addresses the issues of how the session is embedded within the wider work and addresses the development of students' epistemic insight as well as their content (substantive) knowledge.



Not every lesson will be addressing a boundary or misperception, but they should always be developing students' understanding of how knowledge is formed within a discipline (and the interaction between disciplines).

Here there the epistemic focus is on the nature of questioning:

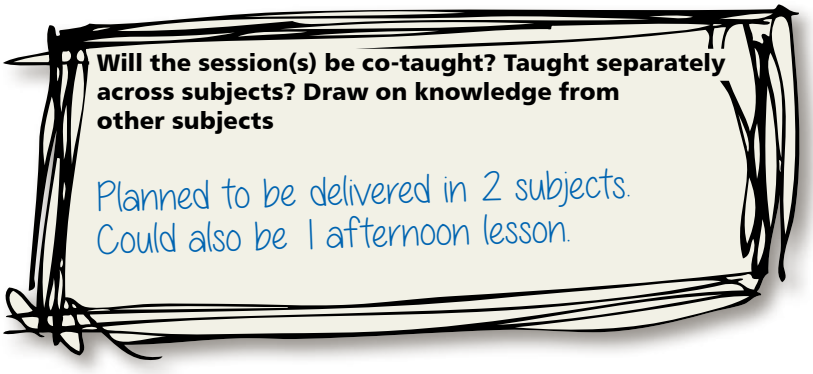
- Relating to the Bubble Tool – that there are often smaller questions that are amenable to science, but that does not mean that every question is amenable to science.
- Relating to preferred questions – both science and history specifically address the formulation of appropriate questions, to be able to do this, students need to understand what makes a question amenable to a particular discipline.



We often check learning in a different lesson (or classroom) in this example the session would be delivered across two lessons so there is a natural space to make direct comparisons to the methods and norms of thought addressed in the other lesson.

If being delivered in a single lesson or across an afternoon, visual reminders about the relationships may be helpful – for example using "disciplinary hats" when investigating within a discipline. This can support prompting of how students are thinking like a particular scholar, and the norms of thought that matter to a historian that are different to a scientist.

Alternatively, you may wish for the focus to remain in the science and history lessons but could refer back to different ways of thinking when looking at the weather in geography and how that might have **informed their thinking** about why the Titanic sank.



Finally thinking about the delivery and whether this could be delivered across both year 5 classes (for example) with students comparing what their discipline had helped them to find out. Or both classes investigating whether they could build an "unsinkable" ship and allowing space for the classes to share how their different disciplinary perspectives meant they had focused on different issues (one class may focus on mitigating human error the other on using better materials – would a polystyrene layer mean it absorbs impact better and therefore would have dented but not torn?).

Lastly it may be that the bridging question is addressed in two different disciplines (history and geography) but students are encouraged to think about how the evidence, or investigation provides a different response to when they are "thinking like a scientist".

Things to Think About: Discipline Hats

Discipline hats (whether physical or visual) act as excellent reminders when examining multiple disciplines in a single lesson. They not only provide a reminder of which discipline is being considered but also the disciplinary "kit bag" associated with it in terms of methods, questions, and norms of thought. Whilst every discipline has a different hat, items in the bag may be shared with different disciplines (especially in relation to methods and norms of thought). The kit bag can also be used to encourage students to sort methods, questions and norms of thought in order to recognise more easily many of the similarities between disciplines and not just focus on the differences.

EPISTEMIC INSIGHT CLASSROOM TOOLKIT

5-MINUTE LESSON PLANNING TEMPLATE

This offers a quick 3 step process to begin planning an epistemically insightful learning experience. **1. Build on current practice** - curriculum content / students' understanding of methods and norms of thought and any curriculum mapping already undertaken.
2. Ask yourself & your students 3 key questions – these highlight the strengths & uniqueness of disciplines & help students to navigate the pedagogical engineering of subject division & curriculum content.
3. Helping students navigate the curriculum requires explicitly building links between disciplines and helping them understand the unique contributions disciplines can make to the same issue/question.

THE BUBBLE TOOL

The Epistemic Insight Bubble Tool provides a strong visual to highlight the powers and limitations science. Is science able to answer the question effectively or does it need other disciplines to inform it? To help students understand amenability ahead of equipping them with the language in upper Key Stage 2 it can help to discuss this in terms of friendship. Very amenable – "best friends", partly amenable – "good friends but we also have other friends too", inform our thinking – "they are part of our class, but we need lots of us to make a class".

DISCIPLINE WHEEL

By placing a big question in the middle of the discipline wheel, it can support students to think about how other disciplines might investigate the question, or how the question might need to be reframed to provide a smaller question for specific disciplines. Content links can be used as a strategy to start the conversation provided students are then invited to use these to consider the preferred methods, questions and norms of thought. The filled wheel can be used to prompt students thinking or the blank wheel can be used to invite their thoughts on necessary disciplines. The filled wheel isn't an exhaustive list of disciplines but does offer examples.

THINKING LIKE A SCHOLAR

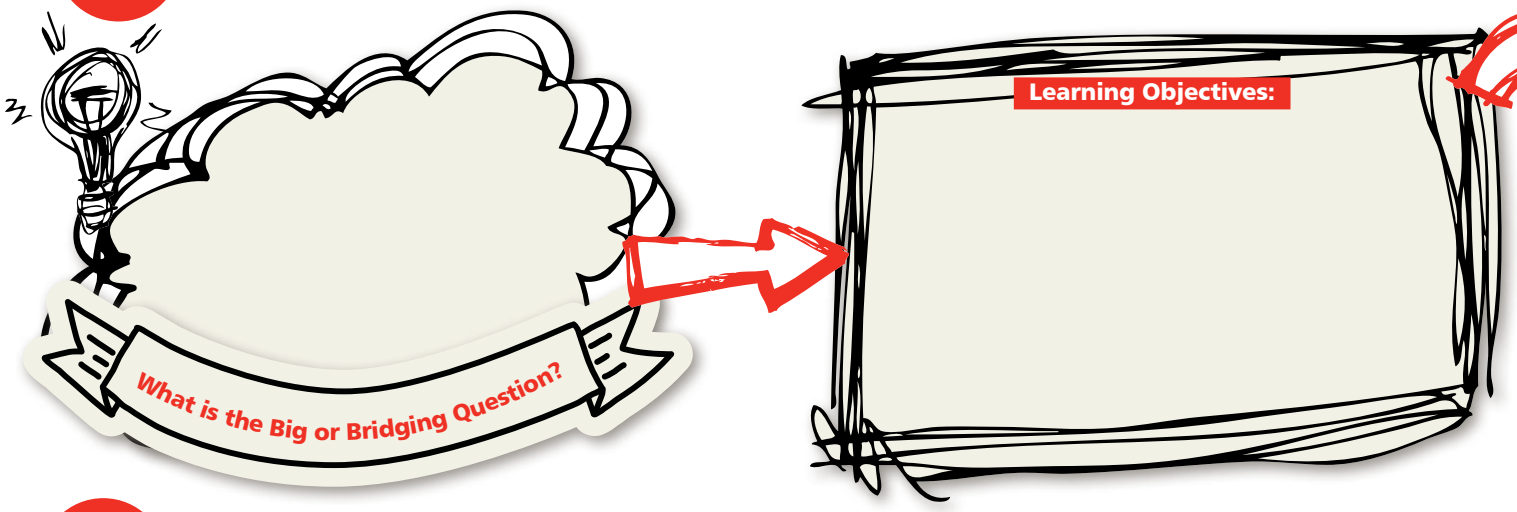
The poster highlights some good examples of what it means for a student to be epistemically insight by the end of Key Stage 2. For students in lower year groups showing epistemic insight can be as simple as being able to sort Big Questions (that need lots of disciplines) from small questions (that fit inside one discipline). For example, knowing that "Why is the World here?" is a different kind of question to "What makes leaves green?". Other classroom tools such as the bubble tool can be used to support students to sort questions and the language can be adapted where appropriate.

The classroom tools have been initially developed for use in Key Stage 2, if you would like to work with us to develop any of them for other Key Stages or reflect SEN/EAL strategies please get in touch, we'd love to hear from you.

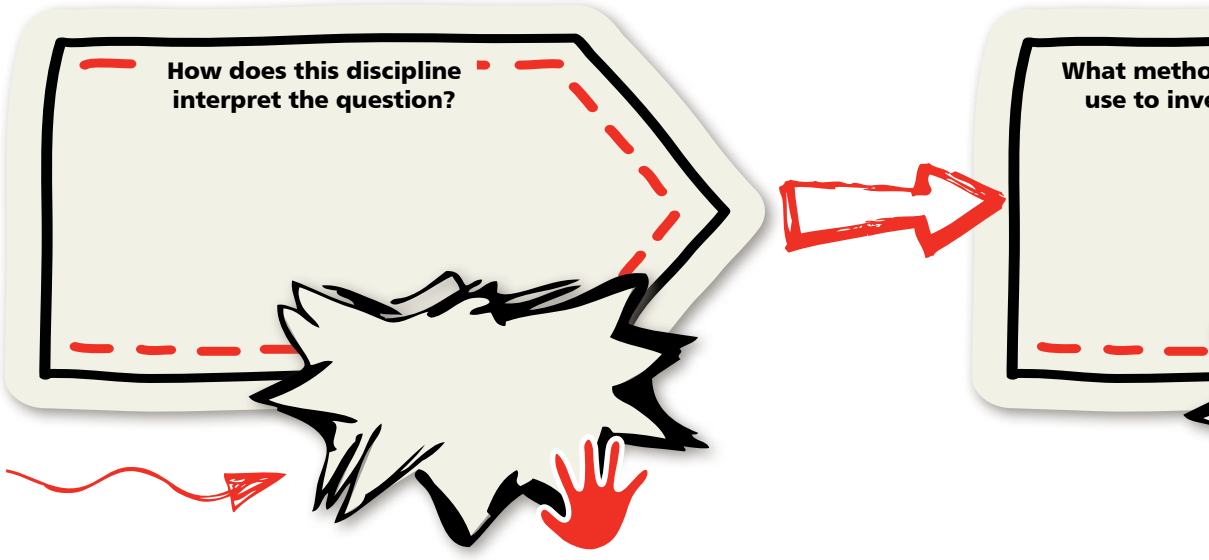
Epistemic Insight

5 minute lesso

1 Building on Current Practice

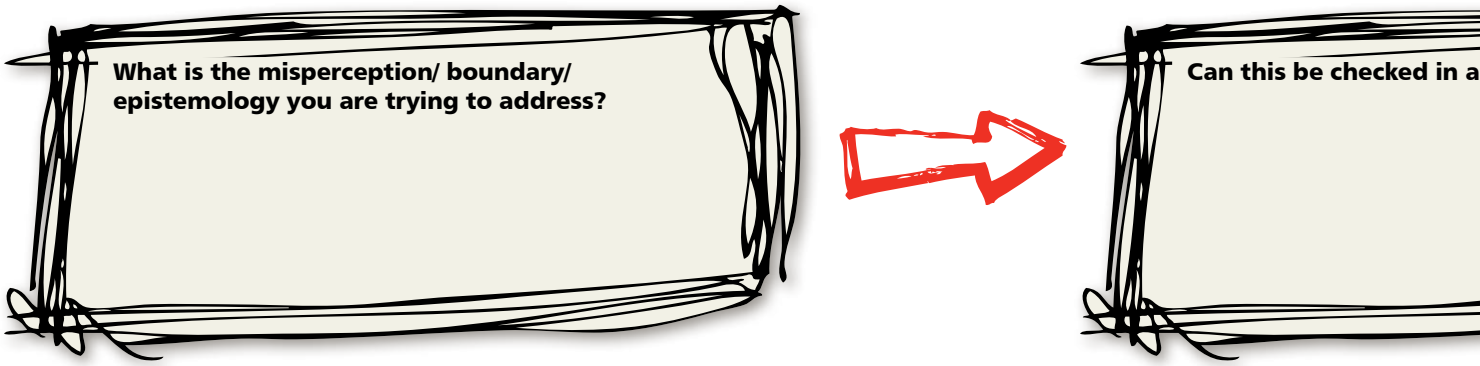


2 Developing Epistemic Insight: How can the students be s



Helping Hands... What expertise/ methods/norms of thought can you draw on from other disciplines to support or contrast?

3 Building Permeable Classroom Walls: Forming links acros



on plan – bridging subject boundaries

Before they investigate, what
Do they already need to know?

How does this map on to other
areas of the school curriculum?

Is this building on existing knowledge?
Challenging misperceptions? Acting as extension?

supported to answer these three questions?

ds would this discipline
stigate the question?

How would (someone in) this discipline
know they had a good answer?

ss the curriculum

other classroom?

Will the session(s) be co-taught? Taught separately
across subjects? Draw on knowledge from
other subjects

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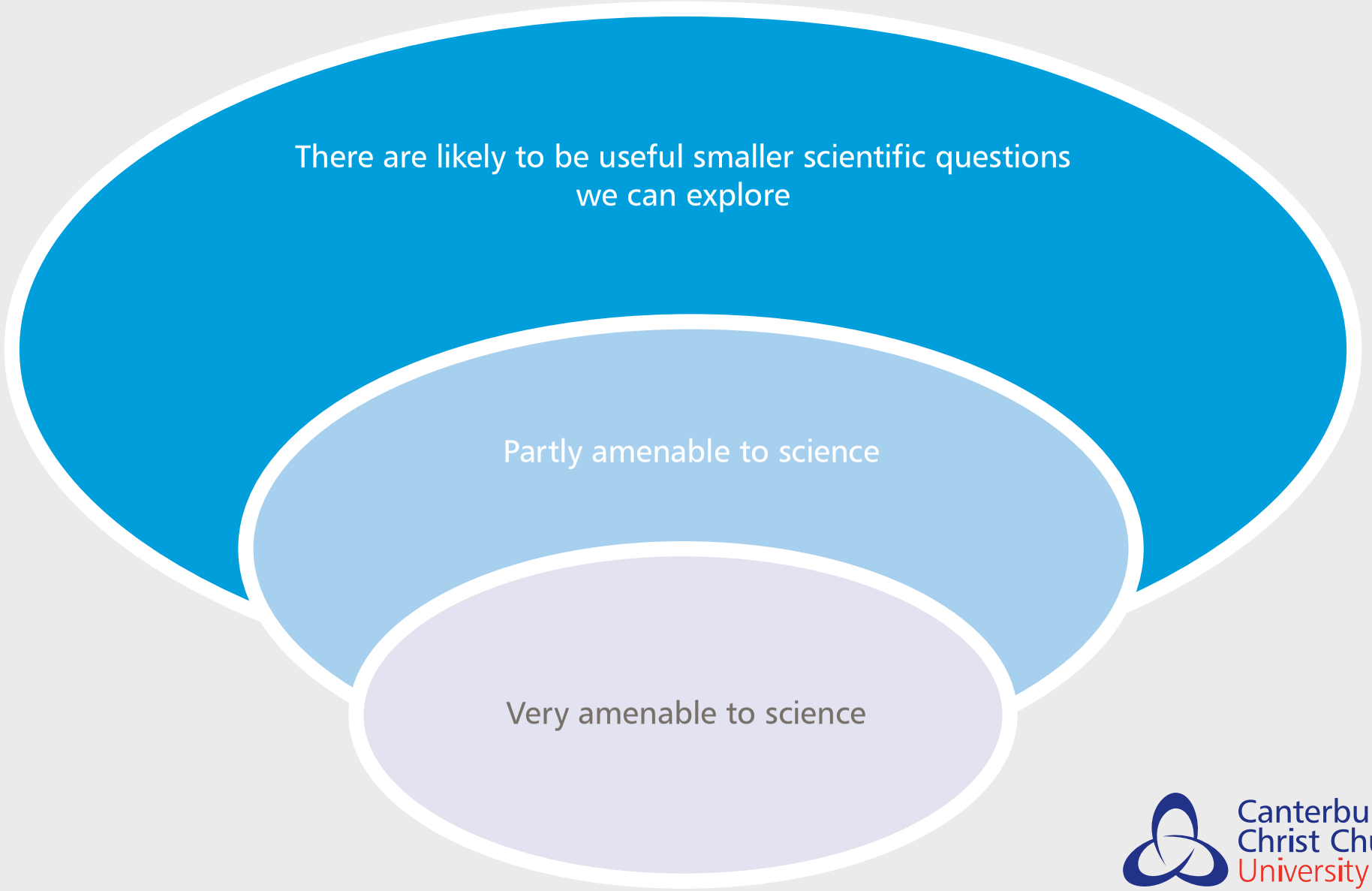

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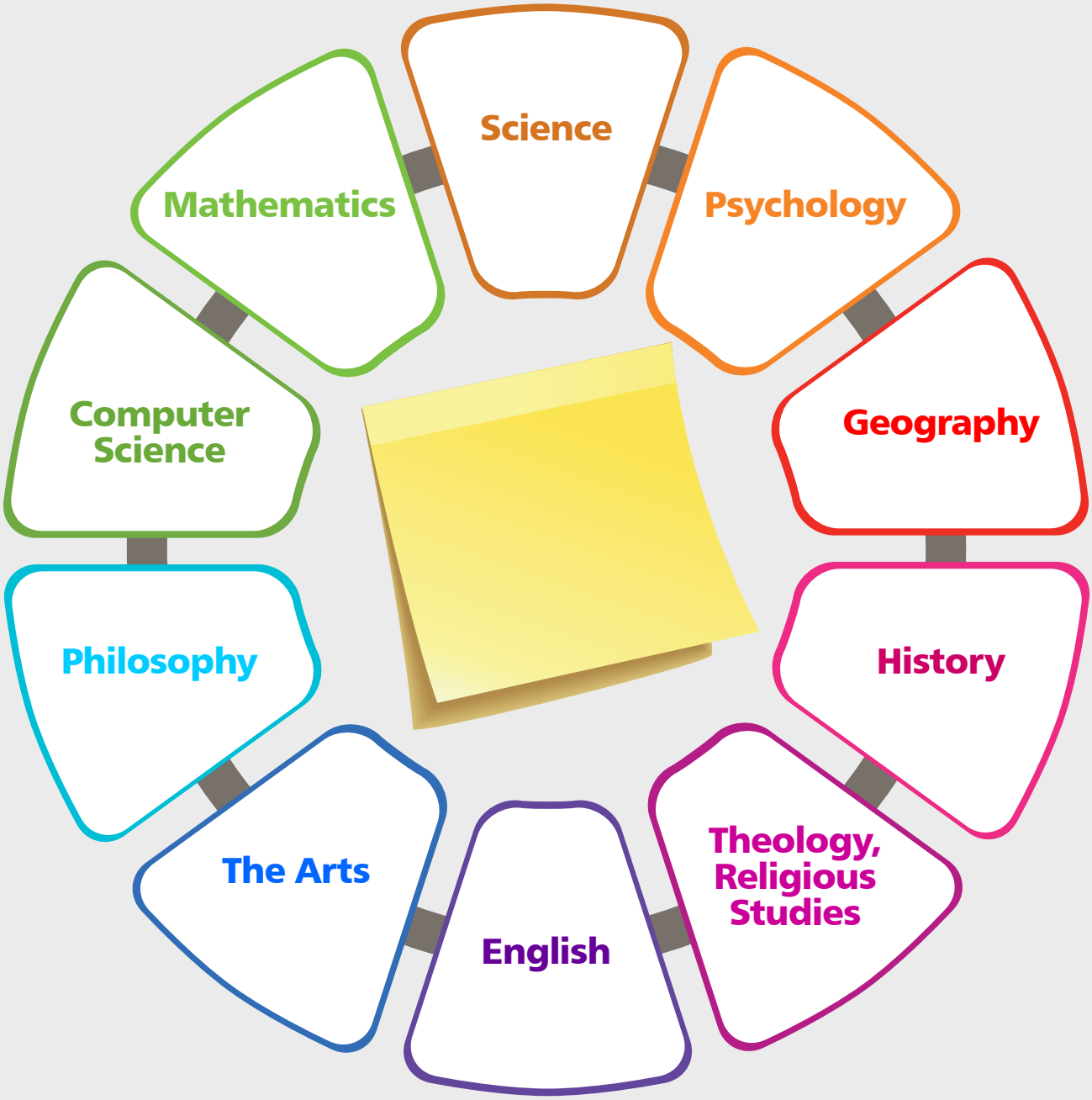
The Discipline Wheel

Put a question in the middle



- **Which disciplines can inform your thinking about the big or bridging question?**
- **How would the discipline(s) you have chosen:**
  - Interpret the question?
  - Investigate the question?
  - Know they have arrived at a good answer?

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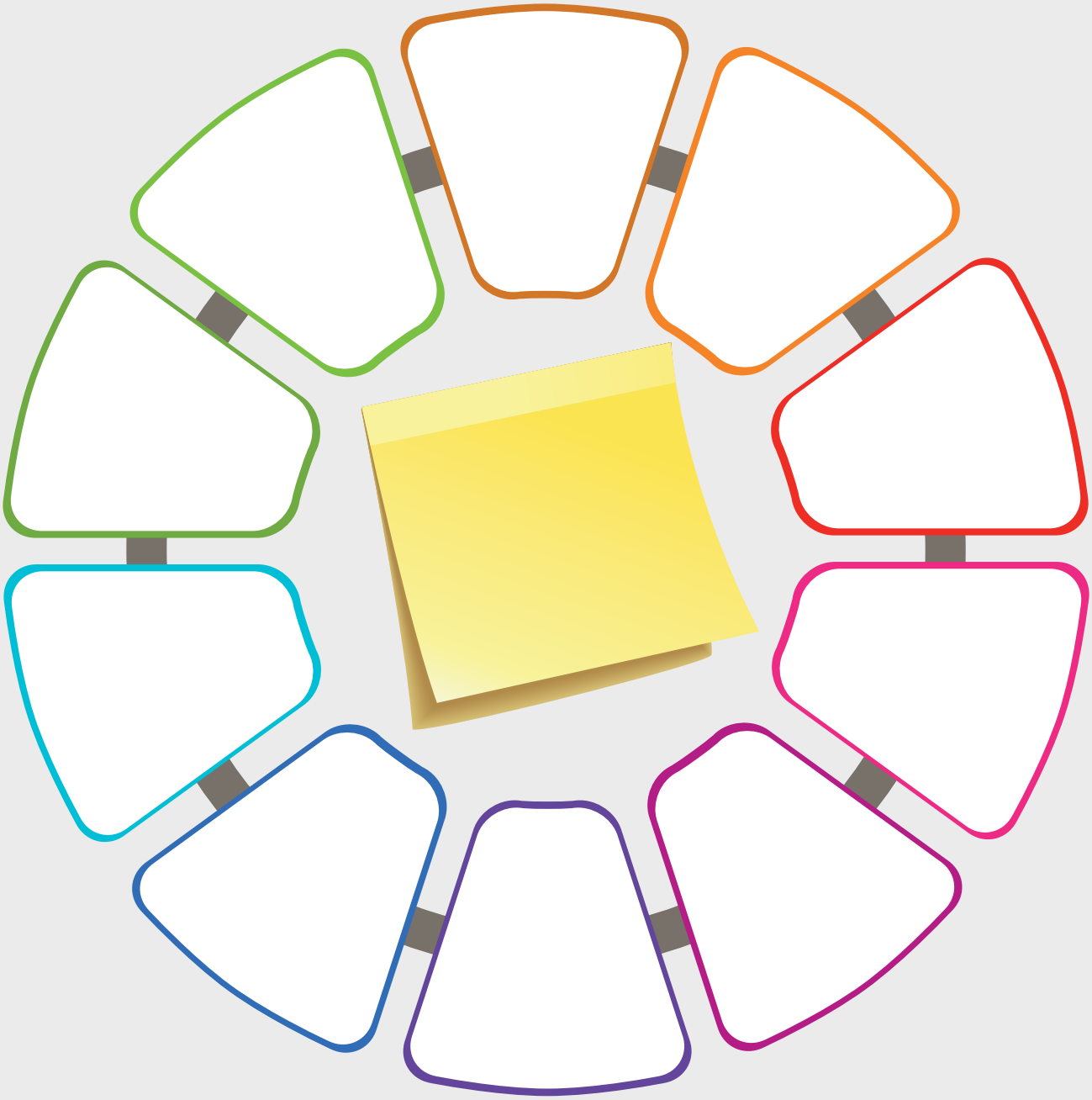

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I am "Thinking like a scholar when…"?

- ✓ I can explain why a question is a good question for science.
- ✓ I can sort questions in to different disciplines.
- ✓ I can explain how science is similar to other disciplines.
- ✓ I can sort little questions than can be answered in one discipline [like science] from big questions that need to be answered using two or more disciplines [like science and history].
- ✓ I can explain how another discipline [like religious studies] is different to science.
- ✓ I can explain how different disciplines investigate a question.
- ✓ I can sort questions that can be answered by science from questions that science cannot fully answer.
- ✓ I can explain how different disciplines help me to investigate a Big Question.

Remember in a discipline we ask/answer the same kinds of question and investigate questions in the same way.

1. How does this discipline understand the question?
2. How would this discipline investigate the question?
3. How would (someone in) this discipline know they had a "good" answer?

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WHAT OTHERS ARE SAYING?

OECD - Organisation for Economic Co-operation and Development

The Future of Education and Skills 2030 project
How do we enable students to be 'future-ready'? …

'Disciplinary knowledge will continue to be important … together with the capacity to think across the boundaries of disciplines and "connect the dots". Epistemic knowledge, or knowledge about the disciplines … will also be significant, enabling students to extend their disciplinary knowledge.'

ASE response to the Ofsted consultation on a new Education Inspection Framework

The Association for Science Education (ASE) strongly supports the proposal to introduce a 'quality of education' judgement; however "some schools may simply create cross-curricular topics by mapping connections in the content across compartments - a practice that would miss the opportunity to plan teaching that develops students' appreciation of both in-discipline and across-discipline epistemology"

www.ase.org.uk/download/files/paragraphs_item-field_download_all_files-6780-0

ACTIVITY 6: KEEP IN TOUCH

If you would like further support to develop an EI lesson, Scheme of Work or activity please email to find out how we can continue to help.

If you would like to organise FREE CPD for your school or have identified an area in the curriculum that you would like support with to develop an epistemically insightful learning experience, send your ideas and questions to **LASAR@canterbury.ac.uk**

LEXICON

VOCABULARY	DEFINITION
Big Questions	A question that is intended to open-up big areas of thought and will need more than one discipline to inform (we may never arrive at a definite answer). Questions about human personhood and the nature of reality, that bridge science, religion and the wider humanities. For example: Can a robot be a good friend?
Big questions and small questions	Big questions draw from multiple disciplines, whereas a small question is one that has been framed to be answered within discipline. The small question may inform our thinking about the big question.
Bridging question	A question that is pedagogically engineering to bridge two disciplines like science and history so that students can compare and contrast how discipline interpret the question, investigate the question and or and knows it has produced a good answer.
Bubble tool	An epistemological tool, which considers the level of amenability a question has to science. Therefore, is it a small question or a big question.
A question that is amenable to science	These are questions that can be answered using scientific methods and produce objective answers. "What is life?" can be viewed as amenable to science the object answer is MRS GREN
Disciplines	A branch or field of knowledge that is studied.
Epistemic Insight	Knowledge about knowledge, particularly knowledge about disciplines and how they interact.
Epistemic Insight Curriculum Framework	Statements about the nature of scholarship and knowledge that reflects the aims of the national curriculum.

Disciplinary / Epistemic knowledge	Knowledge about disciplines and the questions, methods and norms of thought specific to them. Developing an appreciation of the strengths and limitations of individual disciplines.
Discipline Wheel	An epistemological tool, which asks a big question and explores the strengths and limitations of a range of disciplines to answer the question.
Scholar	A person who pursues a field of study to develop expert knowledge.
Subjects	A school subject is a part of learning that is divided up by the national curriculum.
Think like a scholar	Explain how different disciplines investigate a question. Illustrate how another discipline [like history] is different to science.
Multidisciplinary questions	Questions that require more than one disciplinary approach to inform.
Observation	Science begins with observations of the natural world and constructing ways to explain our observations.
Strengths and limitations of a discipline	How effective a disciplines method and norms of thought are in responding to a question
Questions, methods & norms of thought	An example through the lens of Science... Questions: An amenable question for Science: 'Does the size of a parachute affect how quickly an object falls to earth?' (We can come up with an idea about how the natural world works and make predictions and decide what can be measured, observed) and repeated. Methods: Science involves generating and testing ideas about natural phenomena and objects by gathering repeatable objective observations Norms of thought: Scientific knowledge - a good answer in science helps us to understand how the natural world works and is supported by repeatable observations and measurements

Epistemic Insight

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