Science as a Knowledge Source

Lesson 1: Opening Debate

Focus: *Should science be considered the most reliable way of producing knowledge?*

Objectives	● **Examine how we justify whether something counts as scientific knowledge.** ● **Explore how interpretations of scientific evidence can vary depending on method, values, or institutional context.** ● **Recognize the role of perspective, objectivity, and justification in shaping scientific authority.** ● **Challenge assumptions about science being neutral, purely empirical, or universally accepted.**
Activities	**1. Introduction (5 mins)** ● Present the central question: "*What makes knowledge scientific — and why do we trust it?*" ● Introduce the concepts of **justification** (What reasons or methods support the scientific claims we consider as "truth"?), **objectivity** (Is science free from bias or influenced by values?), and **perspective** (Who decides what counts as reliable science?). ● Show a short slideshow of notable scientific developments: ○ The replication crisis in psychology and biomedical science. ○ The Human Genome Project and its large-scale, collaborative structure. ○ Flat Earth misinformation and the role of social media in shaping public trust in science. ○ Climate change denial versus consensus in climate modeling. ○ Indigenous environmental knowledge versus Western scientific conservation models. ○ Historical paradigm shifts like Newtonian physics → relativity/quantum mechanics. ● Ask students to consider: ○ Which of these do you trust the most? Why? ○ What makes something "scientific" in your mind? ○ Can something look scientific and still be misleading? **2. Debate Setup (5 mins)** ● Use the Kialo discussion: "Should science be considered the most reliable way of producing knowledge?" ● Students will respond to the thesis "Science should be considered the most reliable way to produce knowledge." ● Give students time to examine the starter claims, based on the points below. ○ **Starter Claim: Science uses a systematic method to minimize error.** ■ PRO: Methods including experimentation, peer review, and falsification make science uniquely self-correcting and trustworthy over time. ■ Counterclaim: Despite its methods, the replication crisis (e.g., publish-or-perish culture) shows that error and unreliability persist. ■ Reasoning Question: Can a method still be called reliable if its outcomes are often flawed in practice? ○ **Starter Claim: Scientific knowledge consistently leads to practical, testable outcomes.** ■ PRO: Science produces technologies that improve health, infrastructure, communication, and security with predictive success (e.g., vaccines, climate models) showing strong reliability. ■ Counterclaim: Other knowledge systems (e.g., Indigenous, spiritual, intuitive) also lead to effective outcomes but are excluded from mainstream validation. ■ Reasoning Question: Does practical success make a way of knowing more reliable, or just more visible? ○ **Starter Claim: Scientific knowledge aspires to universality and objectivity.**

	■ PRO:Scientific laws work across cultures and contexts, suggesting a consistent truth independent of belief or identity. ■ Counterclaim: This “objectivity” can erase local or alternative knowledge, especially non-Western systems, under the guise of neutrality. ■ Reasoning Question: Can a system be truly universal if it emerges from culturally specific origins? ○ **Starter Claim: Science cannot address all types of knowledge.** ■ PRO: Science explains the “how,” but struggles with moral, emotional, or metaphysical truths. Areas like meaning, purpose, and value often require other approaches (ethics, religion, art). ■ Counterclaim: Science can still inform ethical decisions through evidence-based frameworks (e.g., utilitarianism in public health). ■ Reasoning Question: If a way of knowing cannot answer moral questions, can it ever be complete? ○ **Starter Claim: Science is shaped by socio-political contexts.** ■ PRO: Research priorities often follow funding, politics, or dominant worldviews, affecting what questions are asked and who gets to ask them. ■ Counterclaim: While shaped by context, science has internal checks (transparency, international collaboration) that aim to reduce such bias. ■ Reasoning Question: If knowledge is produced within systems of power, can it ever be truly neutral? ○ **Starter Claim: Over-reliance on science risks reductionism and exclusion.** ■ PRO: Not everything valuable can be quantified or measured. Solely privileging science marginalizes emotional, experiential, or cultural insight. ■ Counterclaim: Science increasingly works with other disciplines (e.g., neuroscience + philosophy), showing it can evolve to embrace complexity. ■ Reasoning Question: When does seeking measurable truth obscure deeper, less tangible forms of understanding? **3. Debate (15–20 mins)** ● Students present initial arguments in the Kialo discussion, drawing on real-world examples such as: The Human Genome Project, Climate change denial versus consensus in climate modeling etc. ● Encourage discussion by asking: ○ What makes scientific knowledge more reliable than other ways of knowing — its method, its results, or its institutional authority? ○ Are there forms of knowledge (e.g., ethical, cultural, spiritual) that science cannot reliably address? ○ How do different perspectives (e.g., research scientists, Indigenous communities, corporate funders, politicians) influence what is seen as “valid” science? ○ If scientific knowledge changes over time (e.g., medical treatments, planetary models), can it still claim to be reliable? ○ How do the TOK concepts of justification, perspective, and objectivity help us understand disagreements about scientific knowledge? ○ Can we ever separate scientific reasoning from the values and power structures in which it is produced?
Reflection Questions	Discuss the following reflection questions in open discussion or exit ticket format: ● What was the strongest argument you heard for or against science’s reliability? ● Did any example make you question your trust in scientific knowledge? ● Which concept — justification, objectivity, or perspective — helped you analyze science most clearly? ● Optional extension: Find one scientific claim online this week (news article, TikTok, infographic, podcast). Bring it to the next class. Be prepared to explain whether it seems justified and what makes it trustworthy or questionable.
Resources	● Lesson Slides

	• Kialo Discussion: Should science be considered the most reliable way of producing knowledge?
TOK Concepts	**Justification:** How do empirical methods justify scientific knowledge claims? **Perspective:** How do different stakeholders shape the public's understanding of science? **Objectivity:** To what extent is neutrality in science an achievable goal?

Critical Thinking Concepts	• **Confronting Biases & Assumptions:**
	  ○ Challenging Scientific Supremacy Bias: Reflecting on the assumption that science is always the most trustworthy or superior way of knowing, and questioning who benefits from framing it that way.
	  ○ Recognizing Methodological Bias: Examining the belief that only knowledge produced through the scientific method is valid, and considering what forms of insight or experience are excluded when we adopt this view.
	• **Exploring Contexts:**
	  ○ Stakeholder Analysis: Considering who benefits or is disadvantaged when scientific knowledge is elevated above other systems—e.g., pharmaceutical companies, policymakers, marginalized communities, Indigenous knowledge holders.
	  ○ Cultural and Political Influence: Investigating how funding sources, political ideologies, historical power dynamics, or cultural worldviews influence what scientific questions are asked, how research is conducted, and which findings gain legitimacy.
	• **Responsiveness and Flexibility of Thought:**
	  ○ Adapting Judgments: Being open to rethinking the role and reliability of science after engaging with examples of scientific error, revision, or exclusion of alternative viewpoints.
	  ○ Comparing Epistemic Frameworks: Weighing different approaches to knowledge creation (e.g., scientific, experiential, spiritual, Indigenous) to develop a more nuanced understanding of reliability, evidence, and value across contexts.