



Greater Good in Education  
SCIENCE-BASED PRACTICES FOR KINDER, HAPPIER SCHOOLS

# EXPLORING INTELLECTUAL HUMILITY THROUGH ASTRONOMICAL DISCOVERIES

*"Let me never fall into the vulgar mistake of dreaming that I am persecuted whenever I am contradicted."*

—Ralph Waldo Emerson

## OVERVIEW

Students watch a short video about how astronomical discoveries have shaped humans' understanding of our place in the universe, and then discuss the value of intellectual humility in science and learning.

## PLANNING FOR IT

### WHEN YOU MIGHT USE THIS PRACTICE

- To help students gain perspective on the importance of knowledge
- To encourage greater intellectual humility
- To foster growth mindsets of learning
- Any time of the year

### TIME REQUIRED

- ≤ 30 minutes

### LEVEL

- High School
- College

### MATERIALS

- Video: "[Humility-Carl Sagan](#)" (from 0:00 - 3:33)
- Projector
- [Discussion Questions](#)
- Paper
- Pen/pencil

## LEARNING OBJECTIVE

Students will:

- Consider how historical discoveries have shaped ideas about our place as human beings in the larger universe
- Consider the role of intellectual humility in science
- Reflect on the role of intellectual humility in their own lives

## ADDITIONAL SUPPORTS

- [Making Practices Culturally Responsive](#)
- [Adapting Practices for Students with Special Needs](#)
- [Making a Practice Trauma-Informed](#)
- [Making Classrooms and Schools Trauma-Informed and Healing-Centered](#)

## CHARACTER STRENGTHS

- Intellectual humility
- Growth mindset

## SEL COMPETENCIES

- Self-Awareness
- Social Awareness

## MINDFULNESS COMPONENTS

- Focused Attention
- Open Awareness

## HOW TO DO IT

### REFLECTION BEFORE THE PRACTICE

- Think of a time when you changed your mind about something. What happened to make you do so? How did it feel? Was it easy or challenging to change your view? What are your beliefs about intellectual humility and learning?
- Prior to using this practice, take a moment to watch the [video](#) (0:00-3:33). Consider whether any of the views expressed in the video and/or the discussion questions might challenge students' and/or their families' beliefs. How will you ensure that all views can be safely shared in your classroom?

## INSTRUCTIONS

### INTRODUCING INTELLECTUAL HUMILITY

- Ask students to think of a time when they *changed their mind* about something. Perhaps they were able to understand why their parents didn't allow them to do something. Or maybe they switched their perspective on a social challenge after hearing different views. Perhaps they realized that their younger sibling wasn't as annoying as they thought. Ask:
  - *What made you change your mind?*
  - *How did it feel to change your perspective? Was it challenging or easy to change?*
- Share with students that changing your perspective requires what researchers call "intellectual humility." Ask what they think this term means. Share with students:
  - *Psychologists generally define intellectual humility as an awareness that people hold that their beliefs, opinions, and viewpoints are imperfect or fallible.*
  - *This is because people with greater intellectual humility understand that the evidence on which their beliefs are based could be limited or flawed, or that they themselves might not have the expertise to truly evaluate and understand such evidence.*
  - *Thus, people with greater intellectual humility tend to be more open to others' ideas and opinions.*

### WATCH THE VIDEO

- Introduce the video to students with the following background information:
  - The video offers examples of intellectual humility within the context of astronomical discoveries that have challenged human perspectives.
  - The narrator is [Carl Sagan](#), a renowned astronomer, who was known for his search for life in the universe and his ability to translate astronomy for a non-academic audience.
  - The opening quote is from Voltaire's *Micromégas*, a novella of two extraterrestrial beings who visit Earth and converse with humans. The quote comes from the end of the book when one of the humans declares he knows "the secret", which he reveals in the quote.
  - You might introduce the phrase "plurality of worlds"—the idea that our world is one of many.
- As they watch the video, ask students to note any instances of the presence or absence of intellectual humility.
- Play the [video](#) from 0:00 to 3:33 for students, then ask them to share examples they heard of the presence or absence of intellectual humility from the video.
  - Examples of intellectual humility:
    - 1:21-1:37 "After millennia of philosophical debate, the issue was settled decisively in favor of 'the plurality of worlds.' They might be profoundly different from our planet. None of them might be as congenial for life, but the earth was hardly the only one."
    - 1:39-1:55 "This was the next in the series of great demotions, downlifting experiences, demonstrations of our apparent insignificance, wounds that science has, in its search for Galileo's facts, delivered to human pride."
    - 2:15-2:46 "But by the nineteenth century, observational astronomy had made it clear that the sun is but one lonely star in a great self-gravitating assemblage of suns called the Milky Way Galaxy. Far from being at the center of the Galaxy, our sun with its

- entourage of dim and tiny planets lies on an undistinguished sector of an obscure spiral arm. We are 30,000 light years from the center.”
- 2:51-3:23 “The Milky Way Galaxy is one of billions, perhaps hundreds of billions of galaxies notable neither in mass nor in brightness nor in how its stars are configured and arrayed. Some modern deep sky photographs show more galaxies beyond the Milky Way than stars within the Milky Way. Every one of them is an island universe containing perhaps a hundred billion suns.”
  - Examples of *lack of* intellectual humility:
    - 0:12-0:19 “their persons, their worlds, their suns, and their stars were created solely for the use of man.”
    - 0:38-0:45 “In the 17th century, there was still some hope that, even if the earth was not the center of the universe, it might be the only ‘world.’”
    - 1:58-2:14 “Well, some hoped, even if the earth isn’t at the center of the universe, the sun is. The sun is our sun. So the earth is approximately at the center of the universe. Perhaps some of our pride could in this way be salvaged.”
    - 2:49-2:52 “Well, our Milky Way is the only galaxy.”
  - Next, in small groups or pairs, invite students to discuss one or more of the [following questions](#) (either choose beforehand the questions you want students to discuss, or let students choose):
    - Why is the quote from Voltaire’s *Micromégas*, “...maintained to their faces that their persons, their worlds, their suns, and their stars were created solely for the use of man,” an example of the *lack of* intellectual humility?
    - How did historical astronomical discoveries challenge people’s idea of Earth’s significance?
    - What were the consequences of realizing that Earth was not the center of the universe?
    - How did the idea of “the plurality of worlds” challenge human pride?
    - How might the discoveries described in the video contribute to a sense of humility?
    - Overall, how did the astronomical discoveries described in the video challenge existing beliefs and perspectives? How might intellectual humility have played a role in scientists’ ability to accept and adapt to these discoveries?
    - Why is it important for scientists to be intellectually humble in the face of new evidence?
    - How might intellectual humility impact the way we engage in debates and discussions in class?
    - What can we learn from this video about the way in which knowledge gets generated?
    - How can we apply intellectual humility in our own pursuit of knowledge and understanding?
  - Bring the class back together and facilitate a whole-group discussion based on the questions from the small group discussions. Encourage students to share their insights and thoughts on how intellectual humility is demonstrated in the realm of scientific discovery.

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## CLOSURE

- Invite students to write a short reflection on either how promoting intellectual humility in the classroom might improve learning, or on how the world might benefit from people displaying more intellectual humility.

## REFLECTION AFTER THE PRACTICE

- Do you notice a change in students' behavior? For instance, are they more willing to share their own ideas and/or are they more receptive to others' ideas?
- How else could you support students' practice and development of intellectual humility in the classroom?

## THE RESEARCH BEHIND THE PRACTICE

### EVIDENCE THAT IT WORKS

In several [studies](#) of community college students from Northern California, researchers found that those who had higher levels of intellectual humility were more respectful of and open to hearing from people who held different views.

One of the studies tested whether intellectual humility could be cultivated. One hundred and one of the students were randomly assigned to read an article either focused on a growth or fixed mindset of intelligence. Students then answered questions related to the article, completed seven difficult spatial reasoning problems, and completed several measures, including a measure of intellectual humility. Students in the growth mindset condition reported greater intellectual humility compared to the fixed mindset condition, thus demonstrating that making known the importance of growth mindset can increase our intellectual humility.

### WHY DOES IT MATTER?

In our performance-obsessed culture, admitting to mistakes and recognizing one's gaps in understanding can be difficult at times, hindering the learning process. Teachers can help reduce such pressures by fostering greater intellectual humility among students, helping them to feel safe asking questions, sharing ideas, and persisting on difficult tasks. Doing so will also support students' development of skills that are essential to forming strong relationships.

Furthermore, research suggests that intellectual humility is related to developing a greater sense of purpose. Thus, by supporting our students' growth in intellectual humility we might be setting them on track to live more fulfilling and meaningful lives.

## SOURCE

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