

George Capaccio

Albert Einstein: Relatively Speaking

Educational Guide, Grades 4-12



About the Performance

Meet the man whose name has become synonymous with genius! Albert Einstein, played by George Capaccio, delights audiences as they discover the scientist's very human qualities, following the trajectory of his life from a patent clerk in a Swiss office to a world-renowned figure. Student participation includes learning of his insights into the nature of reality through interactive experiments. Einstein once said, "The true sign of intelligence is not knowledge but imagination." With this guidepost in mind, George has used his own imagination to present Einstein not as some superhuman character but as a real, honest-to-goodness person.



About the Artist

George Capaccio is an award-winning actor, writer, and educator. He has performed at the American Repertory Theater, Boston's Museum of Science, and as the full-time artist-in-residence in the Boston Public Schools using storytelling to advance literacy and complement the language arts and social studies curriculums. In recognition of his teaching skills, he was selected as a Master Artist Teacher by the Massachusetts Cultural Council. George co-hosted *The Children's Room*, a nationally broadcast children's TV show, has published over a dozen youth fiction and nonfiction books, and recorded children's audiobooks for major educational publishers. As an artist-educator, George strives to foster the literacy skills of young people by connecting story with curriculum. He lives in Arlington, MA with his wife Nancy.

Program Learning Goals

1. To introduce the concept of relativity.
2. To explore Einstein's contributions to science and how his ideas changed our understanding of space, time, and gravity.
3. To inspire a willingness to think like Einstein by testing our ideas about the world and what we think is true or not true.

Essential Questions

1. Why is it important to learn from historical figures?
2. How is "meeting" a historical figure different from learning about them in books or movies?
3. What is relativity? Why is it important?

Pre-Performance Note for Students

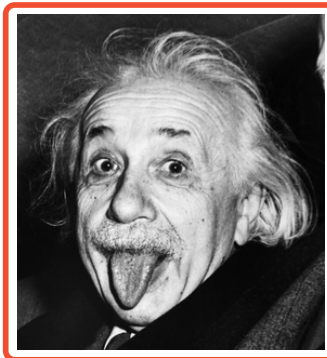
George Capaccio will be visiting your classroom on _____
in a living history program called ***Albert Einstein: Relatively Speaking***.

George is an actor and storyteller. He will appear in character as Albert Einstein, a famous scientist who lived from 1870 until 1955.

Like a play, living history requires you to pretend that you're seeing a real historical figure during this program. George will perform as Albert Einstein and will use a German accent, because Einstein was born and raised in Germany. George will talk about some of the people and experiences that had a lasting effect on Einstein when he was young, and will follow the path of Einstein's life until the year 1919 when he was 40 years old. That year, his greatest theory was proven to be correct and overnight he became a worldwide celebrity! Einstein was also loved and idolized by millions of people of all ages. His long, wild hair, his lively brown eyes, his quick wit, his childlike sense of wonder, and of course the brilliance of his mind made a deep impression on people.

Unlike a regular play, this performance will allow you to interact with Albert Einstein and ask questions about his life and work. You will be invited to take part in simple, fun activities that help explain Einstein's scientific theories. The theories ask us to change our way of thinking, to see things in a new way. Einstein's discoveries in physics over 100 years ago paved the way for things we use and rely on in our daily lives such as GPS navigation, smartphone clocks, laser technology used in supermarket barcode scanners, automatic doors, smoke alarms, and more!

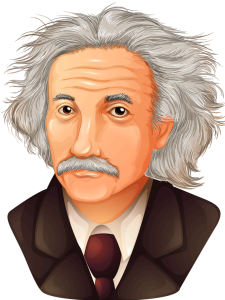
George hopes you will come away from his performance with a sense of just how amazing Einstein was and how much he has given to the world. And perhaps you will be inspired to make your own discoveries and think about things in a new way too!



Vocabulary

- **Physics:** the science of energy, how objects move and interact
- **Energy:** the power to make things move, grow, or work
- **Atom:** the smallest, most basic building block of every object in the universe
- **Mass:** the total amount of material that makes up an object
- **Gravity:** an invisible force that pulls objects toward each other
- **Theory:** a well-tested explanation for how something works, supported by evidence from experiments and observations
- **Space-time continuum:** a mathematical model which combines the three directions of space (up/down, left/right, forward/backward) with the one direction of time

Key Facts and Context for Students



Albert Einstein
(1879-1955)

Who was Albert Einstein?

Albert Einstein contributed amazing discoveries to physics, an important branch of science. He gave the world a brand new way of understanding space, time, and gravity. Long before Einstein lived and worked, scientists tried very hard to figure out what space is made of and whether time is the same for everyone no matter where they are. Sir Isaac Newton, one of the greatest scientists who ever lived, had his own ideas which were so convincing that for over two centuries, Newton had the final word. Any up-and-coming scientists risked losing respect if they disagreed with Newton, until Albert Einstein. He looked up to Newton as much as anyone else, but when it came to challenging ideas, he didn't hesitate to follow his own intuitions. Throughout his life, he was a rebel who did the unexpected, took risks few others were willing to take, and put the pursuit of truth ahead of other concerns.



Sir Isaac Newton
(1642-1727)



What is relativity?

Relativity is the idea that things like speed, time, and gravity are not experienced the same for everyone. They are "relative" to the observer, so one person may think of a situation differently from another. For example, when you are on a moving bus, you feel like you are sitting still. However, to a person outside of the bus, you look like you are moving. So your understanding of the situation depends on where you are and what you are doing.

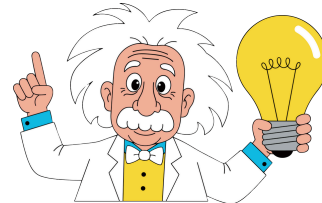
Pre-Performance Discussion Questions

- What do you know about Albert Einstein? What would you like to know?
- What does it mean to be “relative” to something else? Do you experience the world in the same way as your friends?
- Albert Einstein was fond of telling people that his only laboratory was under his hat. He did much of his scientific research inside his own mind. The name he gave to this research was “thought experiments” or “gedankenexperiment” (*ge-dan-ken-ex-per-i-ment*) in German. What kinds of “thought experiments” do you do in your daily life?

Pre-Performance Activity: Think Like Einstein

Learning Goals:

- To develop students’ critical thinking skills
- To introduce the concept of relativity



Directions:

1. Discuss Albert Einstein and his Theory of Relativity with students (see page 2). Tell students that the concept of relativity was a major part of Einstein’s scientific work, and is both a scientific concept and a part of everyday life. Emphasize that his curiosity and creative ways of thinking about a problem led him to this theory.
2. Pose the following situations to the class and encourage friendly debate in answering them. Note that all of these concepts are relative, so there are no correct answers.
 - *Imagine you are running home from a friend's house when it starts to rain. The wind is in your face, hitting you hard with raindrops. You decide to turn around and run back. Is the rain on your back hitting you just as hard? Why or why not?*
 - *Sara can run the bases for a home run in one minute. Does she run fast or slow?*
 - *Santiago is taller than the other students in his class, but almost a foot shorter than his teacher. Is Santiago tall or short?*
 - *You are riding on a moving bus. You stand in the aisle and begin bouncing a ball on the floor. Your friend Alex is standing at a bus stop and watches the bus go by. You see the movement of the ball one way. Alex sees the movement of the ball in a different way. What is the difference between how you see the ball move and how Alex sees the ball move as the bus goes by?*
3. Review the concept of relativity as it pertains to everyday life again. Tell students that in the upcoming performance, George (as Einstein) will present his own understanding of relativity as a scientific concept and will use some of these same examples.

Post-Performance Discussion Questions

- How did George Capaccio bring Albert Einstein and his scientific concepts to life?
- What did you learn about the Theory of Relativity?
- In what ways do you think about science and history from a new perspective?
- How does a living history portrayal like this performance compare to learning about history from books or movies? What did you like best about it?

Post-Performance Activity: Letter Writing

Learning Goals:

- To connect Einstein's scientific contributions to the world in which students live
- To encourage creative thinking, writing, and reflection

Directions:

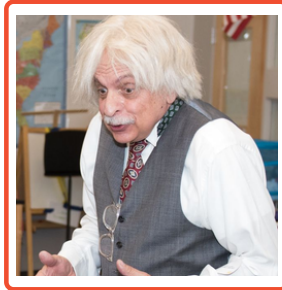
1. Ask students to imagine that Albert Einstein could get a letter from each of them. In their letters, they will write to Dr. Einstein about something that they use that was not invented while he was alive. Remind students:
 - Einstein lived from 1879-1955.
 - Einstein was curious about many things and loved to learn about new things.
 - Einstein died at the age of 76 and never got to see the many inventions and scientific breakthroughs his ideas inspired.
2. With the class, brainstorm a list of modern technological devices. This list could include smartphones, microwave ovens, self-driving cars, laptops, video games, etc.
3. Have each student select one invention and write a letter to Dr. Einstein including:
 - a description of what the invention looks like and why it is useful
 - an explanation of how to use it
 - how the invention is connected to one of Einstein's scientific theories or inventions
4. Share the letters with the class and discuss the influence Einstein continues to have on contemporary life.



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Further Resources

- [George Capaccio Artist Website](#)
- [The Einstein Archives](#)
- [Physics for Kids: Theory of Relativity](#)
- [Trending Sideways: The Theory of Relativity for Kids](#)
- Berne, Jennifer: *On a Beam of Light: A Story of Albert Einstein*, Chronicle Books (2013)
- Calaprice, Alice: *Dear Professor Einstein: Albert Einstein's Letters To and From Children*, Prometheus Books (2002)
- Pohlen, Jerome: *Albert Einstein and Relativity for Kids His Life and Ideas with 21 Activities and Thought Experiments*, Chicago Review Press, Inc. (2012)



Curricular Connections

Arts Standards: Theatre

Creating

- Generate and conceptualize artistic ideas and work. (T.Cr.01)
- Organize and develop artistic ideas and work. (T.Cr.02)

Performing

- Convey meaning through the presentation of artistic work. (T.P.06)

Responding

- Perceive and analyze artistic work. (T.R.07)
- Interpret intent and meaning in artistic work. (T.R.08)
- Apply criteria to evaluate artistic work. (T.R.09)

Connecting

- Synthesize and relate knowledge and personal experiences to make art. (T.Co.10)
- Relate artistic ideas and works to societal, cultural and historical contexts to deepen understanding. (T.Co.11)

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Curricular Connections, continued

English Language Arts and Literacy Anchor Standards

Writing

- Write narratives to develop experiences or events using effective literary techniques, well-chosen details, and well-structured sequences. (W.PK-12.3)

Speaking and Listening

- Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. (SL.PK-12.2)
- Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric. (SL.PK-12.3)

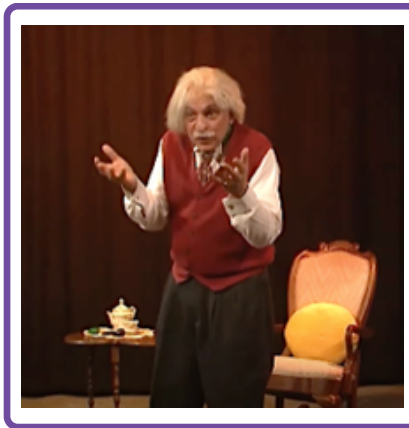
Language

- Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening. (L.PK-12.3)
- Demonstrate understanding of figurative language, word relationships and nuances in word meanings. (L.PK-12.5)

History and Social Science

Grade 9-12

- World History I Topic 1: Dynamic interactions among regions of the world (HSS.WHI.T1)
- World History II Topic 4: The Great Wars, 1914-1945 (HSS.WHII.T4)
- World History II Topic 5: The Cold War Era, 1945-1991 (HSS.WHII.T5)



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Curricular Connections, continued

Science and Technology/Engineering

Earth and Space Sciences

- Earth's Place in the Universe (4.ESS.1, 5.ESS.1, 6.ESS.1, 8.ESS.1, HS.ESS.1)

Physical Science

- Energy (4.PS.3, 5.PS.3, 7.PS.3)
- Motion and Stability: Forces and Interactions (5.PS.2, 6.PS.2, 7.PS.2, 8.PS.2)
- Waves and Their Applications in Technologies for Information Transfer (6.PS.4)

Technology/Engineering

- Engineering Design (4.ETS.1, 6.ETS.1, 7.ETS.1, HS.ETS.1)
- Technological Systems (5.ETS.3, 7.ETS.3, HS.ETS.3)
- Energy and Power Technologies (HSS.ETS.4)

Chemistry

- Motion and Stability: Forces and Interactions (HS.CHEM.2)
- Energy (HS.CHEM.3)

Physics

- Matter and Its Interactions (HS.PHY.1)
- Motion and Stability: Forces and Interactions (HS.PHY.2)
- Energy (HS.PHY.3)
- Waves and Their Applications in Technologies for Information Transfer (HS.PHY.4)

