

RORY COOPER

Trading Card Lesson Plan



CURRICULUM TOPICS

Empathy
Design
Prototyping
Physiology
Physics
Biomechanics

CONTENT

Engineering
Science
Humanities

GRADE LEVEL

Grades 3-12

BACKGROUND

Rory Cooper is a distinguished professor of rehabilitation engineering at the University of Pittsburgh and a senior career scientist for the U.S. Department of Veterans Affairs. His team has developed over 100 inventions and received over 25 patents related to technologies, including wheelchairs, robots, and wearable instruments that have significantly improved the lives of people with disabilities and military veterans.



LESSONS

- ❖ Rory Cooper USPTO trading card activity
- ❖ Learning about the challenges of a disability
- ❖ Who is Rory Cooper helping now?
- ❖ Invent an assistive device
- ❖ Discussion and journal reflection

WHAT IS THE 5E LESSON PLAN?

The 5E lesson plan provides strategic scaffolding to engage students, enhance learning, and assess student learning.

ENGAGE

Pique student interest
Assess prior knowledge

EXPLORE

Collect additional information about the topic

EXPLAIN

Make sense of the concepts and connect to real-world experiences

ELABORATE

Extend learning and apply knowledge

EVALUATE

Formative and Summative Assessments

CONVERGENCE AND TRANSDISCIPLINARY LEARNING

Seamless integration of two or more disciplines is important when trying to teach students how to solve real-world problems.

CONTENT STANDARDS

MATH, GRADES 3-12

Mathematical Practices

Problem Solving and Reasoning

MP.2 - Reason abstractly and quantitatively

NEXT GENERATION SCIENCE STANDARDS

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Disciplinary Core Ideas

Developing Possible Solutions

Crosscutting Concepts

Influence of Science, Engineering, and Technology on Society and the Natural World

MS-PS 2-5 - Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

ENGLISH LANGUAGE ARTS STANDARDS

WHST.6-8.7 - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

RST.6-8.3 - Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical task.

ART STANDARDS

Program 8 - Demonstrate willingness to experiment, innovate, and take risks to pursue ideas, forms, and meanings that emerge in the process of artmaking or designing.

COMPUTER SCIENCE STANDARDS

2-AP-15 Seek and incorporate feedback from team members and users to refine a solution that meets user needs.

CONVERGENCE AND TRANSDISCIPLINARY LEARNING

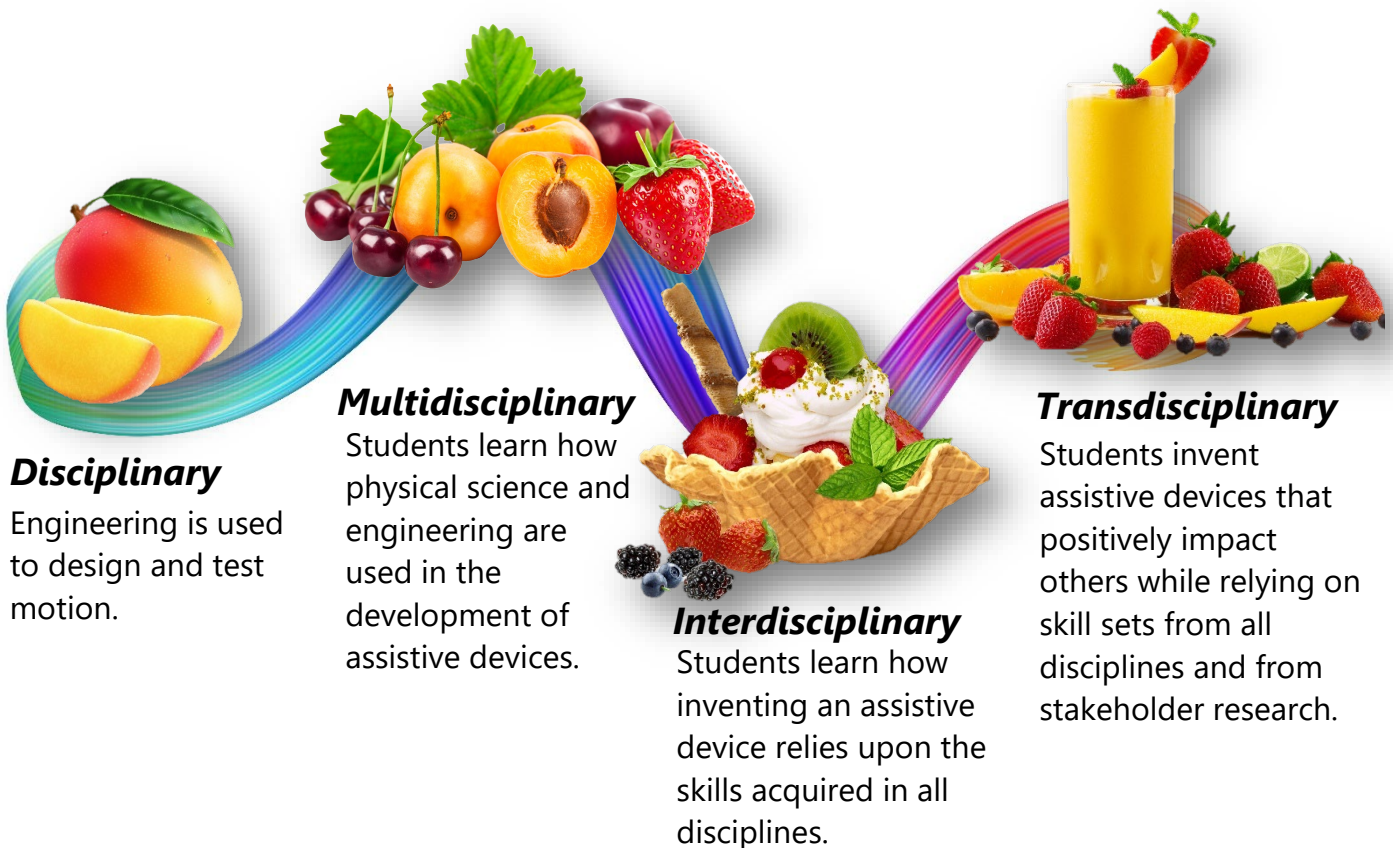
The Federal Government released a report called *Charting the Course for Success: America's Strategy for STEM Education*. This five-year plan aims to build strong foundations for STEM literacy, increase diversity, equity, and inclusion in STEM and prepare a STEM workforce for the future. One of the pathways to success emphasized in the strategic plan is to engage students where disciplines converge. This lesson plan provides an example of how to implement transdisciplinary learning.

"The most transformative discoveries and innovations take place at the junctures where disciplines converge. Discovery and innovation will be catalyzed by an education system that integrates knowledge and methods across STEM, the arts, and the humanities and requires students to ask and answer questions crossing traditional disciplinary boundary lines."

Charting the Course for Success: America's Strategy for STEM Education.

As convergence emerges as a leading research method at the national level, it is essential to consider how it applies to K-12 education.

The images below provide a visual of various approaches to instruction. The USPTO offers materials that model a convergent and transdisciplinary approach to instruction.



RORY COOPER:

Trading Card Lesson Directions



ENGAGE: A USPTO inventor trading card activity challenge: Eating better with Rory Cooper

The ENGAGE section of this lesson plan will introduce Rory Cooper's work and his assistive technologies patents.

❖ **TIME:** 30 minutes

❖ **MATERIALS:**

- Plastic utensils
- Paper
- Tape
- Cardboard
- Paper clip
- Rubber band

❖ **BACKGROUND:** Students select a plastic utensil to modify and reinvent according to the directions in the Trading Card Activity Sheet.

❖ **INSTRUCTIONS:** Explain in basic terms what a patent is and describe why Rory Cooper and other inventors felt it was important to receive a patent for creating assistive devices. Students complete the trading card activity: A USPTO Inventor Trading Card Activity Challenge: Eating better with Rory Cooper.

❖ **STUDENT ACTIVITY HANDOUT:**

A USPTO Inventor Card Activity Challenge

Rory Cooper trading card activity: Eating better with Rory Cooper



EXPLORE: Learning about the challenges of a disability

The EXPLORE section of this lesson plan engages students in learning about different disabilities and how the creation of assistive devices alleviates challenges.

❖ **TIME:** 30 minutes

❖ **MATERIALS:**

- 3x5 cards with names of disabilities written on the back
- Internet access

❖ **BACKGROUND:** Students will learn about persons with disabilities and associated assistive devices. Numerous persons with disabilities exist, and they each have their challenges. For centuries, inventors have sought to alleviate those challenges with assistive devices. For example, ordinary eyeglasses are a form of an assistive device. As time has passed, the number of assistive devices has increased, ranging from low to high-tech solutions.

❖ **INSTRUCTIONS:**

1. Write down the name of a condition a person with a disability may experience on the back of a 3x5 card from the database: Job Accommodation Network – [A to Z of Disabilities and Accommodations](http://askjan.org/a-to-z-of-Disabilities-and-Accommodations) (askjan.org/a-to-z.cfm).
2. Hand out a card with a different disability listed to each student.
3. Have students research the disability listed on the card and explain how the disability would impact a person.
4. Have students research assistive devices invented to alleviate challenges that the person with the disability may experience.
5. Links to some of Rory Cooper's patents:
 - [Variable Compliance Joystick with Compensation Algorithms](#)
 - [Wheelchair Pushrim](#)
 - [Steering Mechanism for a Personal Vehicle](#)
 - [Mobility Enhancement Wheelchair](#)
 - [Computer Pointing Device](#)
6. Have students work in pairs or small groups and ask them to share their findings.

❖ **STUDENT ACTIVITY HANDOUT:**

Learning about the challenges of a disability



EXPLAIN: Who is Rory Cooper helping now?

The EXPLAIN section of this lesson plan engages students in learning about Rory Cooper's biographical information. Students explore what he is currently working on in the field of assistive technology.

❖ **TIME:** 40 minutes

❖ **MATERIALS:**

- Paper and pencil
- Internet access
- Access to YouTube

❖ **BACKGROUND:** Rory Cooper was injured in a bicycle accident that left him paralyzed from the waist down. He has drawn from his experiences to help invent assistive devices for persons with disabilities. Many standard devices used in daily life do not accommodate the needs of everyone. An assistive device allows a person with a disability to perform a task more easily and equitably.

❖ **INSTRUCTIONS:**

- Students will watch a 4-minute YouTube video featuring Rory Cooper and his work.
- Students will answer four questions based on the video content.
- Students will share their answers and discuss.

❖ **STUDENT ACTIVITY HANDOUT:**

Who is Rory Cooper helping now?



ELABORATE: Invent an assistive device

The ELABORATE section of this lesson plan enables students to participate in an invention challenge in which they create an assistive technology device or aid for a person with a disability.

❖ **TIME:** 60 minutes (optional: longer if time allows)

❖ **MATERIALS:**

- Paper and pencil
- Internet access
- Safety apparel, equipment, and procedures
- Cardboard
- Tape

- Scissors
- Glue
- Craft materials
- Building bricks or building toys (optional)
- Manufacturing tools available (optional)
- Hand tools
- 3D printers
- Laser cutters

❖ **BACKGROUND:**

- **Option One Background:** Many people use wheelchairs, which prohibit them from using waterparks and amusement parks as freely as non-disabled persons. Rory Cooper invented a special wheelchair called the Pneu-Chair for Morgan's Wonderland Park. The Pneu-Chair allows children who use wheelchairs to access the waterpark. [Video of Rory Cooper's Pneu-Chair and how it works](http://www.youtube.com/watch?v=slc5PVDLQMM) (www.youtube.com/watch?v=slc5PVDLQMM).
- **Option Two Background:** Many people with disabilities require assistive devices that allow them to use standard daily devices. An assistive device helps a person with a disability perform a task more easily and equitably. Engineers and inventors think of ideas that they turn into working prototypes and eventually products that people use to assist them in their daily activities.
- Refer to Rory Cooper's patent for [Wheelchair for Specialized Sports Applications US2021/0283952 A1](#) as an example for drawing and labeling components.

❖ **INSTRUCTIONS:**

Option One Instructions:

1. Research and select a problem that someone who uses a wheelchair would experience at a water park or amusement park.
Example: A person using a wheelchair unable to enter a rollercoaster car.
2. Clearly define the problem that you are trying to solve through further research. Consider interviewing someone that would benefit from your invention.
3. Draw your invention and label all components, describing their function.
4. Make a rapid prototype (fast version) of your invention to prove the that it can work.

5. Use building blocks or building toys to create a rapid prototype.
6. Test your rapid prototype and modify it as needed.
7. Once satisfied with your testing results, make a revised version of your working prototype.
8. Share the assistive device you invented with an audience (classmates, adults, friends).

Option Two Instructions:

1. Research and select challenges that persons with disabilities experience.
2. Research and select a specific problem associated with the situation a person with the disability is challenged by and what they need to perform tasks equitably.
Example: A person with arthritis that cannot hold a spoon while eating from a bowl.
3. Through further research and an interview with a beneficiary (someone who would benefit from your invention), clearly define the problem you are trying to solve.
4. Draw your invention and label all components, describing their function.
5. Make a rapid prototype (fast version) of your invention to prove the concept (that it can work).
6. Test your rapid prototype and modify it as needed.
7. Once satisfied with your testing results, build a revised version of your working prototype.
8. Share the assistive device you invented with an audience (classmates, adults, friends).

❖ **STUDENT ACTIVITY HANDOUT:**

Invent an assistive device



EVALUATE: Lead a discussion or create a journal reflection with students

Use the following questions to guide student discovery and connections to the inventions of Rory Cooper:

1. Why is it essential to provide more access for persons with disabilities?
2. What is the role of inventors in helping provide equitable access for persons with disabilities?
3. What role does Rory Cooper have in providing persons with disabilities equitable access to the world around them?

VOCABULARY

ASSISTIVE DEVICE

Something that provides assistance.

BENEFICIARY

A person or thing that receives help or an advantage from something: one that benefits from something.

DISABILITY

A physical, mental, cognitive, or developmental condition that impairs, interferes with, or limits a person's ability to perform specific tasks or actions or participate in typical daily activities and interactions.

INTELLECTUAL PROPERTY

Creations of the mind that may include but are not limited to inventions, written, artistic, and design works. These may be protected by acquiring a patent, trademark, copyright, or trade secret.

PATENT

A grant of a property right issued to the inventor by the United States Patent and Trademark Office, that confers the right to exclude others from making, using, offering for sale, or selling the invention in the United States or importing the invention into the United States.

TRADEMARK

A word, name, symbol, or device that is used in trade with goods to indicate the source of the goods and services and to distinguish them from the goods and services of others.

COPYRIGHT

A form of protection provided to the authors of "original works of authorship," including literary, dramatic, musical, artistic, and certain other intellectual works, both published and unpublished.

TRADE SECRET

Information that has either actual or potential independent economic value by not being generally known, has value to others who cannot legitimately obtain the information, and is subject to reasonable efforts to maintain its secrecy, for example, the formula for the beverage Coke®.