



AMERICAN FARM BUREAU FOUNDATION FOR AGRICULTURE®

EDUCATOR'S GUIDE

Acknowledgments

This publication is produced by the American Farm Bureau Foundation for Agriculture[®].

Welcome Educators!

This guide was developed to accompany the book, *Hero for the Hungry: The Life and Work of Norman Borlaug.* Hero for the Hungry is a moving and informative biography of the 20th-century American agriculture scientist whose innovations in crop varieties founded the Green Revolution and fed hundreds of millions of people around the world.

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For more information on the Pillars of Ag Literacy, visit http://www.agfoundation.org/resources/ag-pillars.



AMERICAN FARM BUREAU FOUNDATION FOR AGRICULTURE' The American Farm Bureau Foundation for Agriculture[®] is building awareness, understanding, and a positive public perception of agriculture through education.

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Overview

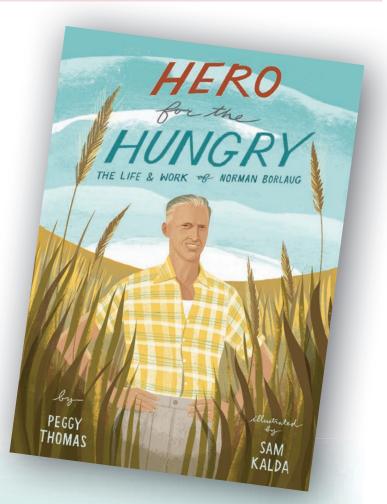
Grade Levels 6-10



Pillars of Ag Literacy, Common Core Standards, and Next Generation Standards are listed before each activity. Materials are listed separately for each activity. Each lesson can be a standalone lesson.

Reading the book

Before doing the lessons, ensure students have finishing reading *Hero for the Hungry*. It may be helpful to do some book discussion before diving into the lessons.



Lessons:

Activity 1: Sing A Song! (English/Language Arts)
Activity 2: Breaking News! (Science & English/Language Arts)
Activity 3: Nobel Peace Prize Emcee Introduction (English/Language Arts)
Activity 4: IMPACT (Science)
Activity 5: Local Food Bank Interview (English/Language Arts)
Activity 6: Hunger with a Capital H
Activity 7: Food Waste Innovation (Science & Engineering)
Activity 8: Choose to...End Hunger (Science & Engineering)
Activity 9: Amending the Soil (Science & Engineering)
Activity 10: Hidden Heroes (English/Language Arts, Science & Engineering)
Activity 11: How Does our Community Get Fed? (English/Language Arts)
Activity 12: Healthy Plants (Science & Engineering)
Activity 13: Science Hero Trading Cards (English/Language Arts)



Sing a Song!

45 Minutes

Standards aligned: CCSS.ELA-LITERACY.WHST.6-8.2

The Pillar of Ag Literacy addressed: The Relationship Between Agriculture and Food, Fiber and Energy

Objectives:

- Identify key points in Norman Borlaug's life.
- Create a song about Norman's life outlining key moments.

Materials:

• Hero for the Hungry

Procedures:

Students create a song in small groups highlighting events from the life of Norman Borlaug.

- 1. In front of the class, do a large group recap of events from the book. As students share events they remember, capture them on the board and sort them into a review timeline of events from Norman's life.
- 2. Read or sing the Iowa Corn Song from chapter one. Discuss how the song impacted Norman through his realization that it brought people together despite their differences.



- 3. Divide the class into small groups, with at least three students per group. There should be few enough groups that each group will have time to present their creation to the class.
- 4. Give students approximately 15 minutes to create a song, poem, rap, or other piece of creative literature about Norman's life. Their creation should include at least six events from the book.
- 5. Allow students to share what they wrote with the class.



Breaking News!

45 Minutes

Standards aligned:

HS-PS4-2 Waves and their Applications in Technologies for Information Transfer

CCSS.ELA-LITERACY.WHST.6-8.2.B

The Pillar of Ag Literacy addressed:

The Relationship Between Agriculture and the Economy

Objectives:

- Write a news report about a specific event from *Hero for the Hungry*.
- Share a news report with an audience.

Materials:

• *Hero for the Hungry* (one copy per student)

Procedures:

Students learn about journalism in the 1930s and write a newspaper snippet or news radio script about an assigned event from the book.

- 1. Ask students what resources they use to receive news related to current events. Then, ask how news was shared during Norman's lifetime. As a class, discuss the differences and similarities of how information was shared in the two time periods.
- 2. In the 1930s, citizens received news from the newspaper or through the innovation of in-home radios. A couple elements are critical for both newspaper articles and radio news stories to be effective: a hook to get the audience's attention and good journalistic writing that focuses on facts.
- 3. Optional: If the school allows and has the resources, give students time to research some 1930s news articles.
- 4. Allow students to select an event from the book and write either a three-paragraph news snippet or a short news radio script reporting on the event.
- 5. Allow students to share their news report in pairs or small groups.
- 6. Optional: These snippets could be edited together in a three-column format to mimic a newspaper layout and be pinned somewhere in the classroom.

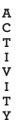
Breaking News Template

(Draw depiction of event from book)



Headline: ___

Story:



Nobel Peace Prize Emcee Introduction

45 Minutes

Standards aligned: CCSS.ELA-LITERACY.WHST.6-8.8

The Pillar of Ag Literacy addressed: The Relationship Between Agriculture and the Economy

Objectives:

- Explain the key parts of an introduction
- Create an introduction for an award recipient

Materials:

- Hero for the Hungry
- Internet Access

Procedures:

Students create an introduction for Norman Borlaug and another Nobel Prize winner of their choice.

- 1. To build interest, research a Nobel Prize winner that interests you and introduce them to the class.
 - a. Alternatively, to explain the goal, teachers can use this sample: Say: "Our next winner received the Nobel Prize in 1922 for his service to theoretical physics, and specifically the discovery of the law of the photoelectric effect. He has worked as a professor of physics at the Universities of Bern, Zurich, Prague, and Berlin. The law of the photoelectric effect has led to many technologies that I use, including light sensors and solar panels. Please give a round of applause for Albert Einstein!"
- 2. Introduce students to the EPN introduction format.
 - a. E Experience(s) qualifying the nominee. In other words, why do they deserve a Nobel Prize?
 - b. P Personal effect the nominee has had or will have in your life.
 - c. N Name
- 3. Task students with introducing Nobel Prize winners to the class. For each introduction, students will need to research qualifying experiences, brainstorm a way the nominee has affected or may affect their life, and be sure to save the name for the end.
- 4. Allow students time to craft an introduction for Norman Borlaug as he received his Nobel Prize. Students can share their introductions in small groups or pairs.
- 5. Optional: Ask students to research a Nobel Prize winner of their choice and craft an introduction for that winner. Their introduction should include the elements listed above.
- 6. Have students share their second nominee introductions with the class.

Nobel Prize Introduction Worksheet

E: Experience (Use this space to describe the nominee's experience that qualifies them for the Nobel Prize.)

P: Personal Effect (How do you see this person's findings in your life?)

N: Name (Remember to save the name for the end!)



IMPACT

Two 45-minute Class Periods

Standards aligned: HS-ESS3-4 Earth and Human Activity

The Pillar of Ag Literacy addressed:

The Connection Between Agriculture and Technology

Objectives:

- Analyze the impact of Norman Borlaug's innovations.
- Identify impacts of the Green Revolution on agricultural practices.

Procedures:

Students develop a timeline or infographic of Norman's work and innovations and compare the timeline to estimates of the effects of the Green Revolution and world hunger.

1. Share the goal of the day with students before allowing them to work independently or in small groups.

Say: "Norman Borlaug helped increase food production using the best tools he had at the time. We know more about these tools, specifically fertilizers and pesticides, today and the environmental impact they can have. How, why, when, and how much of these materials to use are questions farmers face every day as they balance the risks and benefits. In this lesson, you will research what the Green Revolution was and how farmers are using better technology and science to come up with more sustainable farming practices today."

- 2. Prompt students to work in groups to create a timeline of Borlaug's agricultural practices. This may also include his DuPont inventions, wheat varieties, and corn varieties. *Hero for the Hungry* would be a great reference to have on hand during this activity.
- 3. Allow students time to develop a timeline that visualizes some of the breakthroughs during the Green Revolution and Norman's time compared to some more recent breakthroughs. Referencing Chapters 5 through 10 may be helpful. Timelines may be created on paper, computers, whiteboards, or with sidewalk chalk.
- 4. After creating their timelines, allow students to present their timeline to another group. Have the groups discuss how Norman's practices may have affected the environment.
- 5. Ask groups to research how many lives are credited as saved by Norman's work and the Green Revolution as a whole. Have students add the impact numbers to their timelines. After collecting information from multiple sources, discuss findings as a class.

Materials:

- Hero for the Hungry
- Internet Access
- Paper
- Writing Utensils

IMPACT Part 2

Procedures:

Students research modern agricultural sustainability practices and develop an infographic to present to their classmates about one of those practices.

1. Ask the students to talk in groups and recap the previous class session. If they still have their timelines, they can look at them to reflect on the Green Revolution.

2. Say: "Farmers today focus on growing crops in ways that are more sustainable for the environment than practices in Norman's time. Today you will have the opportunity to research sustainable farming practices and teach the class about one."

3. Direct students to research sustainable farming practices and develop an infographic that captures the following:

- a. What is different about the method?
- b. How is it done?
- c. Why it is more sustainable.

4. Farm Bureau's sustainability page could be a good resource to kick off their research.

5. Allow students to build an infographic in PowerPoint, Canva, Google Slides, or another design tool. When done, students can share in front of the class or in small groups depending on time.

6. Discuss and reflect as a class.

Say: "After researching sustainability practices, take some time to think. Do you have any ideas that could help make farming more sustainable? If Norm was alive today and faced with a similar task, what might he have done or come up with?"





45 Minutes (Optionally two class periods)

Standards aligned: CCSS.ELA-LITERACY.RH.6-8.2 CCSS.ELA-LITERACY.WHST.9-10.9

The Pillar of Ag Literacy addressed:

The Relationship Between Agriculture and the Economy

Objectives:

- Interview a community member with insight into food insecurity.
- Develop an action plan for supporting a local food bank.

Materials:

• Interview Questions (provided below or created by students)

Note: This lesson may highlight challenges that are central to the communities in which it is taught. Although an important subject, care should be taken in the discussion surrounding the lesson.

Procedures:

Students interview a local food bank employee or volunteer. Invite the employee to speak to the students either in person or virtually and encourage students to prepare questions.

Below are sample questions that may inspire thoughtful conversation.

- 1. Before and after the interview with the food bank worker, have students answer the following self-reflection questions:
 - 1. How prevalent is hunger in my local community?
 - 2. What can I do to help fight hunger?
 - 3. To what extent can I make a difference when it comes to food insecurity?
- 2. Sample questions for conversation:
 - 1. What do food banks do to help the hungry?
 - 2. How prevalent is hunger is our community?
 - 3. What opportunities are there for volunteers to help at the food bank?
 - 4. What is your job at the food bank?
 - 5. How many meals a month or year does the food bank provide?
 - 6. Who is eligible to receive the meals?
 - 7. How can school organizations get involved with the food bank?
 - 8. In what ways can agricultural breakthroughs help fight hunger?
 - 9. Do you ever work directly with agricultural producers?
 - 10. What can we do as students to combat hunger?

Post interview: Students develop a plan for supporting a local food bank as an individual and as a member of a school or community organization they participate in.

After the interview, students reflect by completing the attached worksheet using the instructions below.

- 1. Prompt students to reflect on a time they volunteered for a good cause or did a good deed. They should write a few sentences about their experience and how it made them feel.
- 2. Allow students to use class time to develop a plan to support their local food bank based on the interview with a food bank employee and/or research done during class. They should develop a personal plan as well as a plan for a club or organization they are involved in to volunteer and support the food bank in the fight against hunger.
- 3. Using the worksheet below, students will identify goals to help combat hunger (one as an individual and one for a group) and action steps necessary to meet this goal.

Hunger Helper Action Plan Worksheet

What can I do to help the hungry at home?

Steps to accomplish this goal:

What can _____(fill in club or group name) do to fight hunger?

Steps to accomplish this goal:





45 Minutes

Standards aligned: CCSS.ELA-LITERACY.WHST.9-10.4

The Pillar of Ag Literacy addressed:

The Relationship Between Agriculture and the Economy

Objectives:

- Analyze hunger in the local and global community.
- Describe the impact of hunger on their community.

Materials:

- Hero for the Hungry
- Writing Materials (paper and pencil or computer)

Note: This lesson may highlight challenges that are central to the communities in which it is taught. Although an important subject, care should be taken in the discussion surrounding the lesson.

Procedures:

- 1. Students develop an outline and write an essay about hunger, focusing on either the local community or global community.
- 2. The essay should be persuasive in nature, first describing hunger in the community of their choice, then encouraging readers to help fight hunger and outlining ways they can help. Students should integrate the concepts of Hunger with a Capital "H" as identified in *Hero for the Hungry*.
- 3. Provide class time or assign writing as homework.



Food Waste Innovation

45 Minutes

Standards aligned: HS-ETS1-1 Engineering Design

The Pillars of Ag Literacy addressed:

The Relationship Between Agriculture and the Economy & The Connection Between Agriculture and Technology

Objectives:

- Discover emerging technologies in agriculture.
- Develop a blueprint for a novel invention to decrease food waste.

Materials:

• Hero for the Hungry

Procedures:

Students learn about food waste and new technologies in agriculture. Students then develop a drawing or prototype of a new invention that could help reduce food waste.

- 1. Allow students about ten minutes to read about food waste at: <u>https://www.fb.org/related/Food+Waste</u>
- 2. Ask the class to reflect on innovations made by Norman Borlaug in agriculture. If students struggle to recall Borlaug's work, guide them to discuss his DuPont inventions, wheat varieties, corn varieties, fertilization techniques, and his efforts in Mexico, India, and Pakistan.
- 3. In some states, heating oil used in home heating is required to be a biodiesel blend. This means that restaurants have the opportunity to sell their used cooking oil to refineries rather than throwing it out. This innovation cuts down on food waste and increases the use life of products. Ask the students to reflect on this innovation and discuss other possible uses of waste products that come to mind.
- 4. Allow students time to brainstorm food waste solutions and innovations in small groups.
- 5. Have students draw a blueprint or model of their innovative idea. If the idea is a strategy rather than a technology, students can develop a written plan for implementation of the idea.
- 6. Allow students to present their innovations to the class in a "Shark Tank" or Elevator Pitch style summary.

Food Waste Innovation Worksheet

(Student's drawing of innovation below)

How does your invention operate? (Or if it is an idea, explain the idea.)

How does this help eliminate food waste?



Choose to...End Hunger

45 Minutes

Standards aligned: HS-ETS1-3 Engineering Design

The Pillar of Ag Literacy addressed:

The Relationship Between Agriculture and the Economy

Objectives:

- Develop a hunger focused solution and presentation of the solution.
- Explain the potential impact of a hunger focused solution.

Procedures:

Students select a "Choose to" prompt from *Hero for the Hungry* and teach their solution to their classmates with a slideshow presentation.

- 1. Free-write: Give students time at the start of class to write about a time they had to develop a plan to solve a problem and followed through on that plan. Ask a few students to share their stories with the class.
- 2. Allow students time to read and select one of the "Choose to" prompts from *Hero for the Hungry* page 145 (listed below).
 - a. Waste less
 - b. Donate to food pantries
 - c. Eat local
 - d. Participate in the World Food Prize Youth Institute
 - e. Celebrate World Food Day on October 16
- 3. Students should create action items related this prompt and develop an action plan for the class. To ensure each plan is thorough, set a minimum of five action steps per plan.
- 4. Allow students to present their plans to the class. Presentation length will vary depending on the class size but be sure to include time for discussion.
- 5. Allow students to select an accountability partner. In the following weeks, have students discuss their progress with these partners to encourage the completion of their plans.

Materials:

- Hero for the Hungry
- Computer or Slideshow-capable Device

Choose to End Hunger Worksheet

I choos	se to:	(fill in the prompt you selected)
To do	this, I pledge to:	
1.	Action step:	
	Description:	
2.	Action step:	
	Description:	
3.	Action step:	
	Description:	
4.	Action step:	
	Description:	
5.	Action step:	
	Description:	
	Signature:	
	Accountability partner:	



Amending the Soil

Multiple class periods

Standards aligned: MS-ETS1-3 Engineering Design

The Pillar of Ag Literacy addressed:

The Relationship Between Agriculture and the Environment

Objectives:

- Explain appropriate growing conditions for a given crop.
- Design an experiment to test soil nutrient effects on plant growth.

Materials:

- Hero for the Hungry
- Six, 10-inch Indoor Planting Pots
- Corn, Wheat, and Soybean Seed
- UV Growth Lamps (need varies depending on season)

Procedures:

Students grow plants in soil that has been amended with different sources of nutrients and compare growth over time.

- 1. Ask students to recall Norman's field days from Chapter 7 of *Hero for the Hungry*. Discuss the fertilizer field day and Norman's findings that the various fertilizers increased growth.
- 2. Divide students into three groups. Assign each group a crop: corn, wheat, or soybean.
- 3. Provide the soil amendments listed below as well as seeds for the crop each group was assigned. Students will plant a control plant (in soil without the amendment) and an experiment plant (in soil with the soil amendment). Depending on the season, students should set up their experiments outdoors or near a window or in a school greenhouse, if available.
 - a. Corn soil amendment: compost
 - b. Wheat soil amendment: coffee grounds
 - c. Soybean soil amendment: lime or compost
- 4. Allow students to formulate hypotheses on which plant will grow best based on their research.
- 5. Over the following days and weeks, have students care for the plants and write observations in a scientific journal.
- 6. After an appropriate amount of time, revisit the experiment and allow students to share their findings with the class.

Hidden Heroes

45 Minutes

Standards aligned: HS-ETS1-1 Engineering Design CCSS.ELA-LITERACY.W.9-10.2.F

The Pillar of Ag Literacy addressed: The Relationship Between Agriculture and the Environment

Objectives:

- Describe the problem-solving role of a public works employee.
- Identify scientific problems in their local community.

Resource:

Local Public Works Employee

Procedures:

Students interview a local public works employee (e.g., city planner, utilities, construction, maintenance, mechanics) to learn more about the problem-solving nature of public works and the problems they face in their work for the local community. Students then identify a problem they hope to solve in their lives and develop a mission statement and relevant goals that work toward solving that problem.

1. Group discussion.

Say: "Not too many people know who Norman Borlaug was or what he did. Are there hidden heroes in your community? Who are some examples?"

- 2. Ask the public works employee to prepare some brief remarks explaining their job and some of the problems they work to solve.
- 3. Give students advance notice of the visit and instruct them to prepare questions to learn more about the scientific nature of problem solving in the community. See sample questions below (not all of the questions will apply to every public works employee):
 - a. How do we manage waste in the community?
 - b. How do we manage wastewater?
 - c. What happens to water runoff from parking lots in town?
 - d. What problems are you currently working to find new solutions for?
 - e. What do you do when a solution doesn't work the first time?

Procedures continued:

- 4. Have students use the worksheet below to identify scientific problems that they would like to investigate or solve in their lifetime. They can brainstorm these problems in groups or pairs.
- 5. Students should also write a personal mission statement that guides them toward solving their identified problem (e.g., "I will study agricultural logistics to help develop solutions to minimize food waste and global hunger").
- 6. Allow students to identify a career path that will empower them to solve their chosen problem and write a paragraph describing the career and how it relates to their problem and mission.
- 7. Students create a vision board, collage, or some visual that explains or outlines their problem, career path, and mission.

Problem Solver Worksheet

The problem that I want to solve is:

My personal mission statement is:

To solve this problem, I will need to:

My ideas for how this problem might be solved include:



Activity 11: How Does Our Community Get Fed?

Hero for the Hungry

Computer or art tools to create visual

Materials:

Multiple class periods

Standards aligned: CCSS.ELA-LITERACY.RST.6-8.7

The Pillar of Ag Literacy Addressed:

The Relationship Between Agriculture and Lifestyle

Objectives:

- Explain how food is sourced and provided for the local community.
- Develop a food supply chain visual.

Procedures:

- 1. Draw a "path" on the board connecting a crop seed to a dinner plate. Ask students to work in small groups to fill in path with the steps necessary for the seed to become the food on the plate. Use the format of a bulleted list.
- 2. Introduce students to the idea of the supply chain and how their food is sourced through a complex process of producers, processers, suppliers and retail stores.
- 3. Arrange an interview with the head of the lunch program and a manager from a local grocer. Prepare the students to ask questions about where the food in each context is sourced from and what steps it takes to reach their plates.
- 4. Sample questions:
 - a. Where do you order food from?
 - b. Do all products come from the same supplier, or are there multiple suppliers?
 - c. Where do the suppliers get the food?
 - d. Are any products direct from producers?
 - e. What do you think the most important steps are between a producer and the food being (on our plates or in the store)?
- 5. After the interviews, have students fill out the reflection worksheet.
- 6. Have students choose either the grocer or the lunch program and create a supply chain infographic outlining the supply chain associated with their choice.

Supply Chain Interview Reflection Worksheet

What information did you learn that surprised you during the interview?

How complex would you rate the supply chain, 1 being most simple and 10 being most complex? 1 2 3 4 5 6 7 8 9 10

Before the interview, would you have selected the same number? If no, what would you have chosen and why?

What thoughts or feelings did you have while reflecting on the complexity of the food system?

What steps are included in the supply chain?



Healthy Plants

Multiple Class Periods

Standards aligned: MS-ETS1-3 Engineering Design

The Pillar of Ag Literacy addressed:

The Relationship Between Agriculture and the Environment

Objectives:

- Explain the importance of good soil health to plant growth.
- Compare plant growth between different growing mediums.

Materials:

- Five, 10-inch pots
- Sand
- Potting Soil
- All-purpose Plant Food
- Compost or Natural-type Fertilizer

Procedures:

Students plant seeds in various growing mediums and observe the growth over time.

- 1. Inform students about the scope and purpose of the experiment they will be conducting. The same plant will be planted in five different growing mixtures. The growth of the plants will be compared over time. There will be one pot of sand, one of untreated potting soil, one of potting soil treated with all-purpose plant food at a ratio of 1 teaspoon per gallon of water, one of potting soil treated with all-purpose plant food at a ratio of 1 tablespoon per gallon of water, and one pot of potting soil treated with compost.
- 2. Explain that each growing medium will give the seeds different nutrients. Nitrogen, phosphorus, and potassium are three nutrients that are critical in plant growth. Each nutrient is present in all-purpose plant food, as well as many fertilizers used in agriculture.
- 3. Allow the students to prepare the pots and plant the seeds in each medium. Because seeds will differ based on the season, select an appropriate plant for the time of year and conditions. Once seeds are planted, label the pots identifying the growing medium used and the date planted. Treat the appropriate pots with the respective mixtures of all-purpose plant food until the soil appears saturated. Place the pots in a well-lit area.
- 4. Over the following days and weeks, students should record the growth measurements of each plant using the worksheet below. Students should also include a sketch of what each plant looks like at each observation.
- 5. As a teacher, take photos of the plants at determined time periods and create a plant growth slideshow to display the plants' progress.
- 6. Host a class discussion about the growth differences and apparent health of the plants grown in the different mediums with differing amounts of nutrients.
 - a. Discuss what makes a plant healthy or sick and how the scientific work of Norman Borlaug allowed numerous people groups to experience healthy plants.

Date.	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11
Sand	Height:								
	Observations:								
	Sketch:								
Potting	Height:								
Jour- Untreated	Observations:								
	Sketch:								
Potting	Height:								
5011— Treated Lightly	Observations:								
	Sketch:								
Potting	Height:								
Soil— Treated Heavilv	Observations:								
<u></u>	Sketch:								
Potting Soil	Height:								
and Court-	Observations:								
	Sketch:								

Healthy Plants Activity Worksheet





Science Hero Trading Cards

45 Minutes

Standards aligned: CCSS.ELA-LITERACY.RH.6-8.7

Objectives:

- Identify a scientist that is personally inspiring.
- Recount details about a scientist and their contributions to their field.

The Pillar of Ag Literacy Addressed: The Relationship Between Agriculture and the Economy

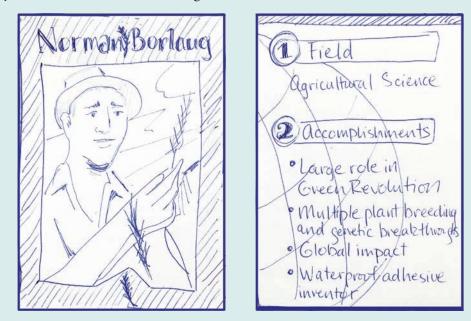
Materials:

• Internet Access

Procedures:

Students identify a scientist and create a trading card that showcases their traits and contributions to science.

1. Example:



- 2. Share the Norman Borlaug example with students. Give students time to find a scientist that inspires them personally. Is there a new Norman Borlaug out there, a researcher or scientist that is making strides on helping feed a hungry planet? Hint: Check out World Food Prize winners!
- 3. Prompt students to create a trading card that outlines details about their chosen scientist.
- 4. Allow students to share their card with the class, including why they chose the scientist and what is exciting about the scientist's work.

References:

- United Nations (UN), (1973). *The Determinants and Consequences of Population Trends. Population Studies*, No. 50., p.10. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2020/Jan/un_1978_determinant-and-consequences-of-population-trends_-_volume_2_0.pdf
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The American Farm Bureau Foundation for Agriculture[®] is building awareness, understanding and a positive public perception of agriculture through education.

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