

CLASSIFIED

The Secret Career of **MARY GOLDA ROSS**,
Cherokee Aerospace Engineer

The picture book biography *Classified: The Secret Career of Mary Golda Ross, Cherokee Aerospace Engineer* (Millbrook Press) will introduce your students to a STEM heroine.

Ross's early interest in mathematics led her to a career in aerospace engineering, designing and improving 20th-century aircraft and spacecraft. Not only was her work groundbreaking, but she stepped into roles that had previously not been open to women or Native Americans.

Knowing that you may already have an aerospace unit or programming, we offer you a kit of materials that invites you to place Mary Golda Ross within the framework of your existing teaching.

If you are looking to add new STEM programming or lesson plans, we include the latest recommendations from educators Suzanne Costner, National Aerospace Education Teacher of the Year 2017, and Charles Fulco, curriculum specialist and NASA Solar System Ambassador.



Lerner™



Award-winning author Traci Sorell shares the important lessons that Ross's Cherokee family and community passed down to her and how those cultural values influenced Ross's goals and work ethic.

Those values include:

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Gaining skills in all areas of life.

ጌታዎቻችን ለሌሎች ለሥራ ለሥራ

Working cooperatively with others.

ዐቅጣጣ ለሌሎች ለሥራ ለሥራ ለሥራ

Remaining humble when others recognize your talents.

ፈጠራ ለሌሎች ለሥራ ለሥራ ለሥራ

Helping ensure equal education and opportunity for all.

Visit: <http://bit.ly/MGRossCherokee> or scan the QR code with your mobile device to listen to the Cherokee words on this page.



KIT INCLUDES

3-6

Aerospace STEM Lesson Plans
Menu of pre-existing lesson plans and resources for grades 2-7.

7

Native American Contributions to the US Space Program

8

Additional Educator Resources

10

Cherokee Values & STEM: Journaling

A prompt and journal sheet to include skill building, cooperation, humility, and mentorship or community action in student STEM projects.

11

Cherokee Language Lesson

STEM activities using shapes and numbers are paired with the teaching of Cherokee words, syllabary, and history.

DIGITAL TOOLKIT

Whether you are creating new lessons or thinking of adding Mary Golda Ross's story from *Classified* to existing events, here are some items that would integrate the book and Ross's STEM values into your project.

Toolkit to Frame STEM Lessons & Events with Mary Golda Ross Contributions

https://lernerbooks.com/classified_toolkit

Readers Theater Script

Google Slide Background

Event Poster Banner Asset

Name Tag Template

YouTube Slides

Participation/Award Medallion Template



You can also download a bilingual poster https://lernerbooks.com/classified_poster of the values Mary Golda Ross brought to her learning and her career.



Activities created for *Classified: The Secret Career of Mary Golda Ross, Cherokee Aerospace Engineer* by Traci Sorell and illustrated by Natasha Donovan (Millbrook Press). Images © Natasha Donovan. All rights reserved. This page may be reproduced for free distribution.

AEROSPACE STEM LESSON PLANS

This list of rocketry and aerospace lesson plans for grades 2-7 was curated to connect with the study of the picture book *Classified: The Secret Career of Mary Golda Ross, Cherokee Aerospace Engineer* (Millbrook Press). They were selected by Suzanne Costner, National Aerospace Education Teacher of the Year 2017, and Charles Fulco, curriculum specialist and NASA Solar System Ambassador

What are the primary STEM correlations? While the majority of Mary Golda Ross's specific work history for Lockheed Martin is still classified, we do know she would have worked on improving flight stability and distances, rocket and missile launches, and on the four forces of flight, or *aerodynamics*. In fact, anything to do with aviation could have been used in her work on correcting design problems with the P-38 and other aircraft. Aeronautics lessons would relate to her work on satellites and missiles and her contributions to Apollo and NASA Planetary Flight Handbook Vol. III.

To integrate with distance learning or lower teaching budgets, many of the lessons have been selected for their use of common household and school items and the simplicity of instruction.

ALL GRADE LEVELS

Fan-tastic Forces (Grades 3-8)

Using a box fan, students will engage in a series of demonstrations focusing on the forces of flight using different materials and shapes to determine which are the most and least susceptible to lift, weight, drag, and thrust.

(Source: NASA)

<http://bit.ly/MGRossForces>

GRADE K AND UP

Principles of Flight: Bernoulli's Principle

To demonstrate the Bernoulli effect, students create a paper bag mask with a tongue that they cause to rise.

(Source: NASA)

<http://bit.ly/MGRossBernoulli>

GRADE 2 AND UP

Paper Airplanes

Patterns are provided for two different paper airplanes and students are asked to compare the performance of each design. (Source: NASA)

<http://bit.ly/MGRossPaperPlane>

Glenn Glider

Students create a glider and experiment with increasing the distance of each flight.

(Source: Jack & MaryLou Davis STEM TECH Lab at New Mexico State University)

<http://bit.ly/MGRossGGlider>

AEROSPACE STEM LESSON PLANS

GRADE 2 AND UP, CONTINUED

The Axes of Flight

Students learn about motion, force, and energy transfer. (Source: NASA)

<http://bit.ly/MGRossAxe>

Rocket Activity 3..2..1..Puff!

Students create a paper rocket and experiment with factors that affect rocket flight stability. (Source: NASA)

<http://bit.ly/MGRossPuff> (Page 42)

Foam Rockets

Using the lesson plan on page 73, students learn about rocket stability and trajectory. (Source: NASA)

<http://bit.ly/MGRossFoam>

Exploring Drag

This hands-on activity allows the student to observe the effects of drag. (Source: NASA)

<http://bit.ly/MGRossDrag>

GRADE 3 AND UP

Fizzy Rockets

Students use Alka Seltzer tablets to fuel a rocket launch and experiment with different amounts of “fuel” and how it affects the flight. (Source: NASA)

<http://bit.ly/MGRossFizzy>

Egg Carton Glider

Students experiment with adding weight to a glider to stabilize the flight. (Source: AMA Flight School)

<http://bit.ly/MGRossEggCarton1>

Four Forces of Flight

Hands-on activities to explore gravity, thrust, lift, and drag. (Source: NASA)

<http://bit.ly/MGRoss4Forces>

Make a Straw Plane

Students adjust control surfaces to observe changes in flight. (Source: NASA)

<http://bit.ly/MGRossStraw>

Straw and Hoop Airplanes/Rockets

Demonstrates drag and thrust. (Source: Science Bob)

<http://bit.ly/MGRossHoop>

AEROSPACE STEM LESSON PLANS

GRADE 4 AND UP

Balloon Lifter

Experiment with the relationship between payload and amount of thrust needed for a launch. (Source: NASA)

<http://bit.ly/MGRossBalloonLift>

Paper Airplane Challenge

Experiment with adjusting surfaces of an airplane to create the longest flight possible. This lesson includes lots of video links to further information extensions. (Source: Nerding: Online STEM Courses)

<http://bit.ly/MGRossNerding>

Levitating Ping Pong Balls

Experiment with ping pong balls to observe effects of Bernoulli's Principle. (Source: National Parks Service)

<http://bit.ly/MGRossPingPong>

Build a Rocket Inspired by SLS

Build a stomp rocket that can carry a ping-pong ball and hit a target.

<http://bit.ly/MGRossSLSRocket>

Engineer an Airfoil

Build a wing that can generate lift from a fan while carrying weight.

<http://bit.ly/MGRossAirfoil>

Build a Long Spanning Wing

Build a wing that can support its own weight over a span of at least two feet. Inspired by Boeing's Phantom Eye. This resource has strong video instructions and the opportunity to post sketches of designs and photos or videos of projects (Students could access the site from home, but will need to sign up.) (Source: Boeing Educational Resources/Curiosity Machine)

<http://bit.ly/MGRossWing>



AEROSPACE STEM LESSON PLANS

GRADE 5 AND UP

FPG-9 Foam Glider

Experiment with the application of Newton's Third Law, airplane control surfaces, and dynamics of flight (pitch, roll, yaw). Additionally, the AMA site has online games that students can enjoy and learn from. (Source: AMA Flight School)

<http://bit.ly/MGRossAMAGlider>

Foam Plate and Plastic Straw Gliders

Builds on the FPG-9 Glider lesson, explores lift and stability. (Source: Ideas-Inspire) <http://bit.ly/MGRossPlateGlider>

Project 3X5

Use 3X5 index cards to make basic and advanced paper airplanes, exploring shape, balance, stability, etc. This site includes a video instructional. (Source: AMA Flight School) <http://bit.ly/MGRossProject>

Changing Pressure

Students see how moving air changes the pressure that affects objects. (Source: NASA) <http://bit.ly/MGrossPressure>

GRADE 6 AND UP

Glenn Engineering Design Challenges: Let It Glide

Includes pre- and post-assessments, facilitator's guide, and can be done in several short sessions. (Source: NASA)

<http://bit.ly/MGRossGlenn>

Unit: Up, Up and Away! - Airplanes

Set of lessons for middle school beginning with the creation of lift and ending with students creating their own balsa designs. There are PDF handouts that could be provided through a learning management system, links to videos, online content, etc. (Source: Teaching Engineering) <http://bit.ly/MGRossUp>

Unit: The Physics of Rockets

A collection of lesson plans on gliders and model rockets. (Source: Estes) <http://bit.ly/MGRossPhysics>

Solid-Fuel Rockets: Rockets in Motion (Not for Distanced Learning)

Students will explain and then (using their solid-fuel model rockets) demonstrate Sir Isaac Newton's First Law of Motion. After being introduced to the four major forces (drag, gravity, lift, thrust) that can act upon a rocket, students will launch their rockets (under teacher supervision) and note when and how the First Law applies to all stages of the flight. (Source: Estes)

<http://bit.ly/MGRossSolidFuel>

Solid-Fuel Rockets: How High Did it Go? (Not for Distanced Learning)

Students will explain the concept of measuring the altitude of a model rocket with "triangulation," using simple trigonometry. Students will then compare their results with classmates and propose explanations as to which variables could be responsible for the same rocket achieving different altitudes on different flights. Results can be graphed for a science fair-type of display. (Source: Estes) <http://bit.ly/MGRossSolidFuel2>

NATIVE AMERICAN CONTRIBUTIONS TO THE US SPACE PROGRAM

Mary Golda Ross and astronaut John Herrington of the Chickasaw Nation each made significant contributions to the US Space Program. Discover more about them with the resources below.

Students will learn about the lives of Native Americans who have made an impact on the US Space Program, including Mary Golda Ross and John Herrington, and other STEM fields like aviation. (Source: US Mint)

<http://bit.ly/MGRossUSMint>

Explore NASA's profile of Mary Golda Ross. (Source: NASA)

<http://bit.ly/MGRossNASA>

Learn about astronaut John Herrington who traveled to the International Space Station in the space shuttle STS-113 Endeavour in 2002:

<http://bit.ly/MGRossJH1> (Source: Oklahoma Historical Society), <http://bit.ly/MGRossJH2> (Source: NASA)

<http://bit.ly/MGRossJH3> (Source: Chickasaw Nation)

Read John Herrington's children's book *Mission to Space* (Chickasaw Press)

<http://bit.ly/MGRossJH4> (Source: Chickasaw Press)



EDUCATOR RESOURCES

ESTES EDUCATOR: SCIENCE AND MODEL ROCKETS

A site for both experienced and novice model rocket teachers and students. Learn construction (including fin placements, centers of pressure, and gravity), basic flight calculations (including engine selection, average speed and altitude), and basic rocket terminology. General curriculum, activity sheets, and certificates are also included.

<http://bit.ly/MGRossEstes1>

ESTES EDUCATOR: MATHEMATICS AND MODEL ROCKETS

Explore and reinforce the important connection between math and science, with practical applications including rocket design, mathematics of flight and engine performance, and altitude calculations. Activity sheets and certificates are also included.

<http://bit.ly/MGRossEstes2>

NASA: STEM ENGAGEMENT/ROCKETS

The Rocket Educator Guide is a downloadable packet of resources, activities, and lessons to assist K-12 teachers and students.

<http://bit.ly/MGRossNASARockets>

CIVIL AIR PATROL AEROSPACE EDUCATOR MEMBERS (AEM):

An AEM is a special category of CAP membership that entitles educators to access products and programs designed especially for teaching aerospace/STEM Education and integrating this fascinating subject into the curriculum. There is a one-time \$35 membership fee. Those members who use the products and services for aerospace education are eligible for free membership renewal each year. Membership benefits include:

More than 30 FREE national academic standards-based aerospace education materials to promote STEM subjects and careers

Participation in FREE AE Excellence (AEX) Award Program, wherein educators incorporate aerospace education into their curricula and earn a free teacher plaque and student certificates

Eligibility to apply for \$250 grants for aerospace project and program integration to invigorate the classroom

Access to myriad online Aerospace/STEM Education activity and career resources

Free K-6 Aerospace Connections in Education (ACE) Program

Free Teacher Orientation Program (TOP) Flights in CAP aircraft

<http://bit.ly/MGRossCAP>

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS EDUCATOR MEMBERS:

AIAA programs and services spark innovation in the aerospace industry—strengthening a high-value profession that helps make the world safer, more connected, more accessible, and more prosperous. AIAA supplies teachers with all the tools they will need to stir the curiosity of their students, and those tools are fun, engaging, and, mostly, “hands-on,” to ensure the students thrive in their learning environment. From classroom grants, to standards-based projects, to Aerospace Micro-Lessons, AIAA is committed to providing students with exceptional learning experiences, and teachers with the tools and resources to create those moments.

<http://bit.ly/MGRossAIAA>

MARY'S CHEROKEE VALUES AND HER STEM CAREER

“Do the best you can and search out available knowledge and build on it. I started with a firm foundation in mathematics and qualities that came down to me from my Indian heritage.”

—Engineer Mary Golda Ross

While a written guidebook on Cherokee values does not exist, important lessons have been taught by Cherokee families to their children for generations. Some of the values that shaped aerospace engineer Mary Golda Ross include:

SYLLABARY: ᎠᎩᎩᎩᎩ ᎠᎩᎩᎩᎩ ᎠᎩᎩᎩᎩ ᎠᎩᎩᎩᎩ ᎠᎩᎩᎩᎩ

TRANSLITERATION: nanisinasv unequotsehv nigav igvnadena na gvnvi

PRONUNCIATION: nah-NEE-see-NAH-suh oo-neh-KWOH-jay-huh nee-gah-uh ee-guh-nah-DAY-nah nah guh-NUH-ee

ENGLISH: Gaining skills in all areas of life

SYLLABARY: ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ

TRANSLITERATION: danalisdeligsv dunilvwidanehv anisoi gvdi

PRONUNCIATION: dah-nah-LEEs-day-LEEs-guh duh-nee-LUH-wees-duh-NEH-huh ah-nee-SO-ee GUH-dee

ENGLISH: Working cooperatively with others

SYLLABARY: ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ

TRANSLITERATION: unalinohiyv nutlvquodvna nayuno anisoi getsolitsehv tsagadohsvvhi gesvi

PRONUNCIATION: oo-nah-ah-LEE-no-hee-yuh new-tluh-kwuo-DUH-nah nah-you-no ah-nee-SO-ee gay-jo-LEE-jay-huh jah-gah-doe-huh-SUH-hee gay-SUH-ee

ENGLISH: Remaining humble when others recognize your talents

SYLLABARY: ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ ᎠᎩᎩᎩᎩᎩ

TRANSLITERATION: asdelisgi yulisdodi igatiha dideloquasdi ale unadlanvdadehv nasgina higada

PRONUNCIATION: ahs-day-LEEs-jee you-lees-DO-dee ee-gah-tee-HA dee-DAY-low-KWAHS-dee ah-LAY oo-nah-dlah-nuh-dah-DAY-huh nahs-GEE-nah hee-GAH-dah

ENGLISH: Helping ensure equal education and opportunity for all

Mary Golda Ross is a STEM heroine. If you read her picture book biography *Classified: The Secret Career of Mary Golda Ross, Cherokee Aerospace Engineer* (Millbrook Press), you will discover that her early interest in mathematics led to her work on the design and improvement of aircraft and spacecraft. Not only was her work groundbreaking, but she stepped into roles that had previously not been open to women or Native Americans. These accomplishments came from bringing her identity as a Cherokee woman and the values of her family and community along with her. They formed the foundation from which she grew her knowledge base and shared her talents to benefit all of us.

Visit: <http://bit.ly/MGRossCherokee>
or scan the QR code with your
mobile device to listen to the
Cherokee words on this page.



CHEROKEE VALUES & MY STEM PROJECT: A JOURNAL

JOURNAL OF YOUR STEM VALUES

Before you start your STEM project, consider the values that served Mary Golda Ross throughout her career. On your own or with your group, consider how those values might influence how you conduct your STEM project. Before, during, and after the project, work with your teacher to keep a journal on how these values are reflected in your STEM work.

Name: _____

Date: _____

Project: _____

Journal Entry: _____

CHEROKEE VALUES

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Gaining skills in all areas of life

᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋ ᠋᠋᠋ ᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋
Remaining humble when others recognize your talents

᠋᠋᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋᠋
Working cooperatively with others

᠋᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋᠋᠋ ᠋᠋᠋᠋᠋᠋᠋᠋
Helping ensure equal education and opportunity for all

THE CHEROKEE LANGUAGE

ᏍᏍᏗᏂᏁᏍᏗ ᏌᏍᏗ | ga-wo-ni-hi-s-di tsa-la-gi

FROM SPOKEN TO SYLLABARY

ᏌᏍᏗ ᏌᏍᏗᏂᏁᏍᏗ | tsu-da-tlu-gi du-no-yv-gv-i

The Cherokee language is one of the most beautiful and complex languages in the world. Here are just some of the things that make it unique:

There are single words in Cherokee that cannot be directly translated into English. In fact, many Cherokee words take several English words to explain.

25% of the English language is verbs or action words. 75% of the Cherokee language is verbs.

For much of its existence, Cherokee was a spoken, but not written, language. The written language was created in the 1820s by Sequoyah, a Cherokee silversmith and blacksmith. Instead of using an alphabet, Sequoyah created a syllabary. Unlike an alphabet, which uses letters to make words, a syllabary uses symbols that combine to form a single word, phrase, or an entire sentence! The Japanese language also uses a syllabary.

How did a six-year-old help establish the Cherokee syllabary?

Initially, many Cherokee people resisted the idea of a unique written language. They were convinced, in part, by the cleverness of Sequoyah's six-year-old daughter Ahyoka when she learned to read from her father's instruction. To read more about Sequoyah and Ahyoka, check out the Sibert Honor bilingual picture book, *Sequoyah: The Cherokee Man Who Gave His People Writing* by James Rumford (HMH, 2004) with translation by Anna Sixkiller Huckaby, a Cherokee Nation citizen and National Treasure for her traditional basket making. You can see how Sequoyah originally wrote the syllabary for words and numbers on page 14.

How does the syllabary work?

English speakers build written words with an alphabet, letter by letter. For example, English speakers use 8 letters to write e-n-g-i-n-e-e-r. The Cherokee word for engineer is ᏍᏍᏗ ᏌᏍᏗᏂᏁᏍᏗ. It looks like it has seven letters, right? Those symbols are not actually letters, though, but syllables.

If we used the English Roman alphabet to write the word (or transliteration), it would look like this: a-tsi-lv di-hi-le-gi.

Sequoyah's written system created a symbol for each of those syllables. In English, "engineer" has eight letters, but it has three syllables or sounds: en-gin-ee-r. The Cherokee word for Mary Golda Ross's profession happens to have seven syllables, and those are the seven symbols or syllabary that represent it in writing.

The Cherokee Nation is committed to preserving and growing the Cherokee language in both spoken and written forms. Look for their extensive language resources at: <http://bit.ly/MGRossCherokeeLanguage>

Visit: <http://bit.ly/MGRossCherokee>
or scan the QR code with your
mobile device to listen to the
Cherokee words on this page.



THE CHEROKEE LANGUAGE

ᏍᏍᏗᏂᏍᏗ ᏌᏍᏗ | ga-wo-ni-hi-s-di tsa-la-gi

CONNECTIONS TO CULTURE & HISTORY

ᏌᏍᏗᏂᏍᏗ | nu-li-s-ta-ni-do-lv

“A lot of people think it is just a language, but if you are Cherokee, it is like your home.”

—Atse Kituwah Immersion Academy student

An important part of understanding Cherokee culture, ceremonial life, and teachings is to understand the Cherokee language. All languages include words and phrases that communicate the values and worldview of a culture. The Cherokee language is no different.

Culture: Beliefs, practices, and values shared by a group of people

—Traci Sorell, *We Are Still Here! Native American Truths Everyone Should Know*

When the British and Europeans came to this continent, they wanted citizens of the Native Nations to stop speaking their languages and practicing their cultural beliefs. After the creation of the United States, this push became part of official government policies. It is called assimilation.

Assimilation: To absorb or integrate people into a broader society

—Traci Sorell

Native Nations did not want to be absorbed into the culture of the United States. Native Nations wanted to keep their cultural identity, exercise their sovereignty over their citizens and land, and speak their languages.

One of the ways that the United States forced Native people to speak only English and to adopt Christianity as their religion involved separating children from their families and sending them to boarding schools.

Boarding schools: Schools operated by the federal government or Christian organizations to assimilate Native children into white US culture

—Traci Sorell, *We Are Still Here! Native American Truths Everyone Should Know*

In the boarding schools, the children were punished for speaking their language and practicing their culture. Native children were not allowed to use the non-English name their family may have given them. They received a new name at the school like John, Mary, Richard, or Jane.

Because these schools were far away, the children could not visit home often. Sometimes they only saw their families once a year. This happened to children of Native Nations across the continent, including many Cherokee, for more than one hundred years.



THE CHEROKEE LANGUAGE

ᑭᑭᑭᑭᑭ ᑭᑭᑭ | ga-wo-ni-hi-s-di tsa-la-gi

CONNECTIONS TO CULTURE & HISTORY

ᑭᑭᑭᑭᑭᑭᑭᑭ | nu-li-s-ta-ni-do-lv

Did this happen to Mary Golda Ross?

Mary Golda Ross was born after Oklahoma became a state. In the hills of northeastern Oklahoma, Mary's mother donated some of her land to allow all local children—including Mary's siblings and cousins—to attend school close to home. As a result, Mary was very lucky to stay with her family. But Mary still learned to read and write English at school.

When Mary got a little older, she moved nearby to Tahlequah and lived with her grandparents to attend high school. She graduated at age sixteen and enrolled in the nearby college that her great-great grandfather, a Principal Chief of the Cherokee Nation, originally helped create. If you visit the campus of Northeastern State University today, you can visit the original building and see where Mary attended college.

Do Cherokee people still speak the Cherokee language now?

Yes! Because of boarding schools and later public schools where English was the only language allowed, the percentage of Cherokee children raised bilingually (both Cherokee and English) went from 75% to less than 5% today. (Source: *Native Languages of America*: www.native-languages.org) Despite this sharp decline, Cherokee is one of the healthiest Native American languages.

Although there are only 2,500 fluent speakers of Cherokee, the three federally recognized tribes—the Cherokee Nation, the Eastern Band of Cherokee Indians, and the United Keetoowah Band of Cherokee Indians in Oklahoma—are all working to increase the number of Cherokee language speakers. The Cherokee Nation and the Eastern Band both operate immersion schools where the Cherokee language is taught to Cherokee children.

Cherokee Language Resources

Cherokee Nation's Language Program with learning resources: <http://bit.ly/MGRossCherokeeLanguage>

Eastern Band's Kituwah Preservation and Education Program: <http://bit.ly/MGRossKituwah>

Watch these 2019 segments from their grade school immersion program: <http://bit.ly/MGRossImmersion1>
<http://bit.ly/MGRossImmersion2>

United Keetoowah Band's Language and Culture: <http://bit.ly/MGRossKeetoowah>

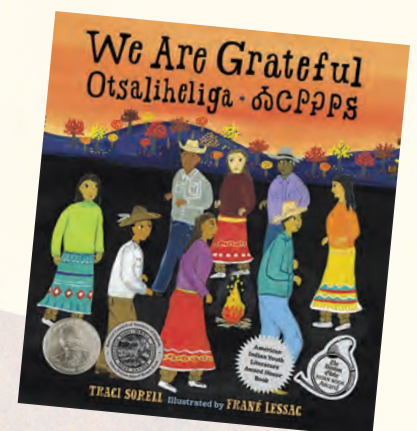
Cherokee-English Dictionary: <http://bit.ly/MGRossCherokeeDictionary>

More about Cherokee language and culture from Traci Sorell:

In 2018, a major US book publisher released the bilingual Cherokee/English picture book *We Are Grateful: Otsaliheliga* by Classified author Traci Sorell. The book became one of the most celebrated books of 2019, winning several awards and much acclaim.

Watch Traci talking about the book:

<http://bit.ly/MGRossGrateful>.



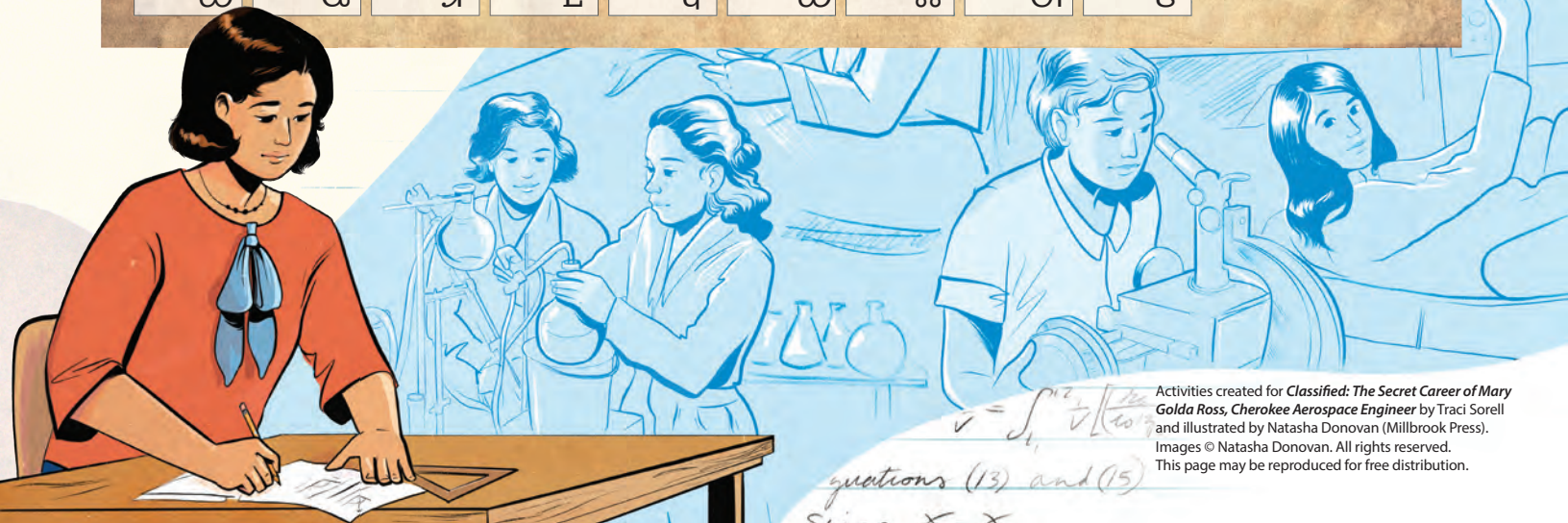
CHEROKEE SYLLABARY

The Cherokee written language was created in the 1820s by Sequoyah, a Cherokee silversmith and blacksmith. Instead of using an alphabet, Sequoyah created a syllabary.

Unlike an alphabet, which uses letters to make words, a syllabary uses symbols that combine to form a single word, phrase, or an entire sentence! Here is Sequoyah's incredible achievement provided by the Cherokee Nation Language Technology project.

Sequoyah's Order

 R	 D	 W	 H	 G	 S	 O	 P	 N	 U	 Y
 A	 B	 F	 T	 M	 C	 Q	 X	 Z	 V	 J
 E	 I	 O	 U	 A	 G	 H	 R	 S	 C	 K
 L	 M	 N	 O	 P	 Q	 R	 S	 T	 U	 V
 W	 X	 Y	 Z	 A	 B	 C	 D	 E	 F	 G
 H	 I	 J	 K	 L	 M	 N	 O	 P	 Q	 R
 S	 T	 U	 V	 W	 X	 Y	 Z	 A	 B	 C
 D	 E	 F	 G	 H	 I	 J	 K	 L	 M	 N
 O	 P	 Q	 R	 S	 T	 U	 V	 W	 X	 Y



WORDS OF AN ENGINEER

ᐃᐢᐱ ᐱᐱᐃᐱ | A-TSI-LV DI-HI-LE-GI

In honor of Mary Golda Ross’s dedication to mathematics and the sciences, we share the following syllabary and transliteration of select Cherokee words.

Our thanks to Cherokee Nation citizens Emilee Chavez for the audio recordings and the Cherokee Language Program and Wade Blevins for the language translation.

GWY

ᑭᑭᑭᑭᑭᑭ GWY
ᑭᑭᑭᑭᑭᑭ SZBET
ᑭᑭᑭᑭᑭᑭᑭ

Aerospace

ᐃᐢᐱ ᐱᐱᐃᐱ
ᑭᑭᑭ ᑭᑭᑭ ᐢᑭᑭᑭᑭ

Shapes

ᑭᑭᑭᑭᑭᑭᑭ
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ᑭᑭᑭᑭᑭᑭᑭ
ᑭᑭᑭᑭ ᑭᑭᑭᑭᑭᑭ
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ᑭᑭᑭᑭ ᑭᑭᑭᑭᑭᑭᑭᑭ

Countdown

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ᑭᑭᑭᑭᑭ
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Celestial Bodies

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ᑭᑭᑭᑭᑭᑭᑭᑭᑭᑭ
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ᑭᑭᑭᑭᑭᑭᑭᑭᑭᑭᑭᑭᑭ

tsa-la-gi

ga-wo-ni-hi-s-di tsa-la-gi
tsu-da-tlu-gi du-no-yv-gv-i
nu-li-s-ta-ni-do-lv

a-tsi-lv di-hi-le-gi

ga-lv-lo we-do-hi tsi-yu-ga-lo

nv-gi-tsu-nv-si-yi

ga-so-qua-lv
no-qui-si
ga-nv-hi-da nv-gi tsu-nv-si-yi
tso-i tsu-nv-si-yi
hi-s-gi tsu-nv-si-yi
su-da-li tsu-nv-si-yi
tsu-ne-la tsu-nv-si-yi

hi-a di-da-se-ka

s-go-hi
so-ne-la
tsa-ne-la
ga-li-quo-gi
su-da-li
hi-s-gi
nv-gi
tso-i
ta-li
sa-quu
a-ni-gi-s-di

nv-da

ma-gu-li
a-na-ni-s-da-ni
e-lo-hi
ma-si
tsu-qui-da
sa-da-ni
u-li-s-qua-na-li
nequaduna
tludo

Cherokee

Cherokee language
syllabary
history

engineer

rocket

square

circle
star
rectangle
triangle
pentagon
hexagon
octagon

Countdown

ten
nine
eight
seven
six
five
four
three
two
one
Liftoff!

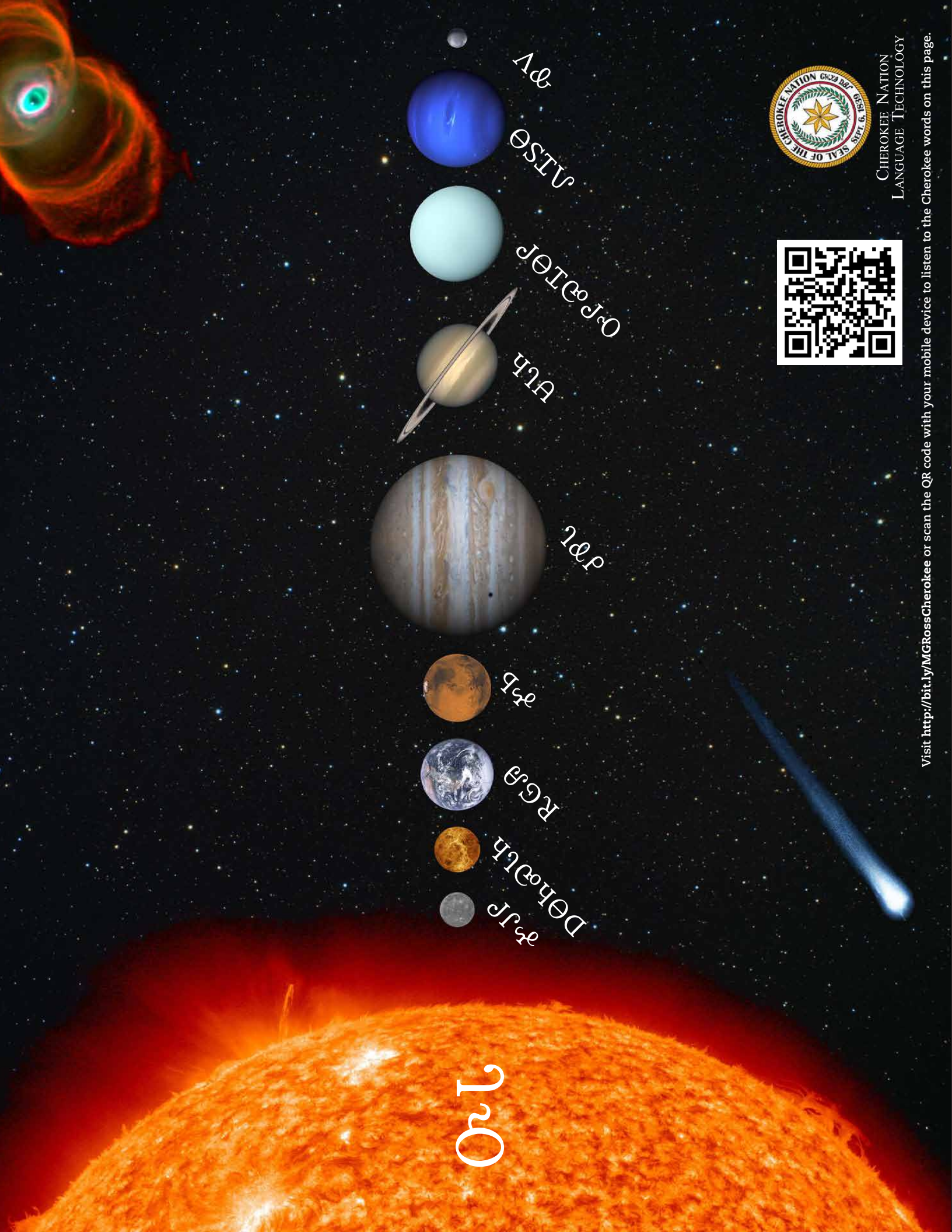
Sun

Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune
Pluto



Visit: <http://bit.ly/MGRossCherokee>
or scan the QR code with your
mobile device to listen to the
Cherokee words on this page.





Orl

Dohath

Rga

Rga

n&P

u7A

J0T00J0

0STU

A&



CHEROKEE NATION
LANGUAGE TECHNOLOGY



Visit <http://bit.ly/MGRossCherokee> or scan the QR code with your mobile device to listen to the Cherokee words on this page.

ROCKETS

ᑭᑦᑲ ᑭᑭᑦ ᑲᑭᑭᑭ | ga-lv-lo we-do-hi tsi-yu-ga-lo

“Mary worked on projects that people had only imagined and some no one had ever thought of before.”

—Classified: *The Secret Career of Mary Golda Ross, Cherokee Aerospace Engineer*

Cherokee engineer Mary Golda Ross designed aircraft and spacecraft with her colleagues. Imagine creating your own machine that will take flight around the world or into space. Use these shapes to collage a picture of an aircraft or spacecraft. If you print the shapes on thicker paper or trace them onto cardboard, can you build a 3D model of your idea?

Can you use the stars to create a galaxy? Explore the Cherokee names of the planets (page 16) and add them into your STEAM creation!

Square

ᑭᑭᑭᑭ ᑭᑭᑭᑭ
nv-gi-tsu-nv-si-ya

Circle

ᑭᑭᑭᑭ
ga-so-qua-lv

Star

ᑭᑭᑭᑭ
no-qui-si

Rectangle

ᑭᑭᑭᑭ ᑭᑭᑭᑭ
ga-nv-hi-da nv-gi tsu-nv-si-yi

Triangle

ᑭᑭᑭᑭ
tso-i tsu-nv-si-yi

Pentagon

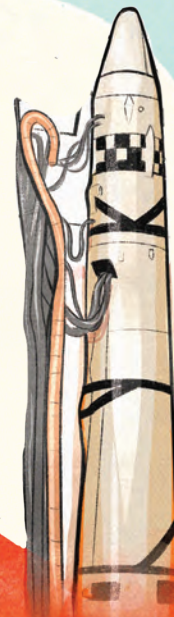
ᑭᑭᑭᑭ
hi-s-gi tsu-nv-si-yi

Hexagon

ᑭᑭᑭᑭ
su-d-ali tsu-nv-si-yi

Octagon

ᑭᑭᑭᑭ
tsa-ne-la tsu-nv-si-yi



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COUNTDOWN

AD Ⴀᆫ4ᆫ | hi-a di-da-se-ka

Cherokee engineer Mary Golda Ross's critical work on spacecraft helped the Apollo space program send astronauts to the moon! Watch the liftoff of the Apollo 11 rocket, a turning point in rocketry and space exploration: <http://bit.ly/MGRossApollo>

In her honor, launch your next rocket or aerospace project with a countdown in Cherokee. Cut out the cards to have the Cherokee syllabary, transliteration, and the link and QR Code to listen to the pronunciation. Count down with your team or on your own!

<p>10</p> <p>ᆫᆫᆫ</p> <p>s-go-hi</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>9</p> <p>ᆫᆫᆫ</p> <p>so-ne-la</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>8</p> <p>ᆫᆫᆫ</p> <p>tsa-ne-la</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>7</p> <p>ᆫᆫᆫᆫᆫ</p> <p>ga-li-quo-gi</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>
<p>6</p> <p>ᆫᆫᆫ</p> <p>su-da-li</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>5</p> <p>ᆫᆫᆫ</p> <p>hi-s-gi</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>4</p> <p>ᆫᆫᆫ</p> <p>nv-gi</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>3</p> <p>ᆫᆫ</p> <p>tso-i</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>
<p>2</p> <p>ᆫᆫᆫ</p> <p>ta-li</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>1</p> <p>ᆫᆫᆫ</p> <p>sa-quu</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	<p>Liftoff!</p> <p>ᆫᆫᆫᆫᆫ</p> <p>a-ni-gi-s-di</p>  <p>LISTEN: http://bit.ly/MGRossCherokee</p>	

These Resources Were Created & Curated by:

TRACI SORELL writes award-winning nonfiction and fiction for young people. A former attorney and policy advocate for Native Nations, she is a Cherokee Nation citizen and lives on her tribe's reservation. *Classified: The Secret Career of Mary Golda Ross* is her first nonfiction biography. You can find out more about Traci and her work online at www.tracisorell.com.

EMILEE CHAVEZ is an undergraduate student at Northeastern State University in Tahlequah, Oklahoma. She learned the Cherokee language from her grandmother as well as graduated from the Cherokee Nation's Cherokee Immersion School.

WADE BLEVINS, M.ED., has been working on Cherokee language revitalization for over a decade. He is a Cherokee Nation citizen whose grandfather was a first language Cherokee speaker and inspired Wade's passion for the language. Blevins teaches the Cherokee language online through Rogers State University's Public TV channel at <https://rsu.tv/cherokee/>.

SUZANNE COSTNER has taught in settings ranging from preschool to community college before finding her perfect home in the school library. Suzanne has been the school library media specialist at Fairview Elementary in Maryville, TN, since 2008. She also serves as the school's STEM coordinator, robotics club sponsor, and Hour of Code coordinator. Suzanne is an educator member of the CAP, the AFA, and the AIAA (where she recently completed her fifth year on the Micro Lessons working group). She has won several awards including: Civil Air Patrol's A.C.E. Teacher of the Year 2015, Tennessee Air Force Association State Award for Aerospace Teacher of the Year 2017, and Civil Air Patrol's National Aerospace Education Teacher of the Year 2017.

CHARLES FULCO is a public school teacher and NASA Solar System Ambassador. He is the former Education Outreach Coordinator for NASA's 2017 Solar Eclipse Task Force, as well as Local Area Director for the International Dark-Sky Assoc. He has collaborated with Buzz Aldrin's ShareSpace.org program, bringing space education to classrooms. Charles works with schools as a science consultant and professional development facilitator, promoting STEM/standards-based learning and environment-focused educational practices, with special emphasis on assisting underserved and underperforming districts.

KIRSTEN CAPPY of Curious City is a children's book engagement consultant that believes fiercely in the power of children's literature to create culturally competent and empowered young citizens. Cappy and her myriad of collaborators are the creators of free programming and classroom guides for librarians, educators and other advocates of the book, all available at CuriousCityDPW.com. She is also the Executive Director and co-founder of I'm Your Neighbor Books, a project that creates welcoming spaces for New Arrivals and New Americans using children's literature and discussion guides on welcoming and belonging.

