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Ag in the Classroom
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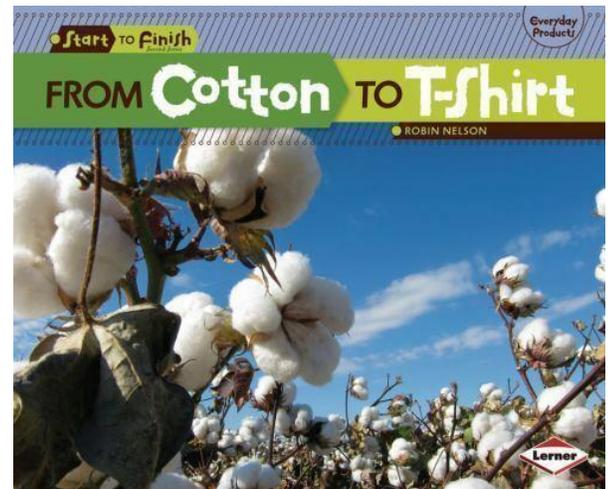
November 2019 Book of the Month

From Cotton to T-shirt

By: Robin Nelson

How did this t-shirt make it to my closet?

This title looks at the journey of a cotton t-shirt, examining how and where the cotton is grown, how it is harvested, how it is turned into fabric and then made into clothes, and how the finished t-shirts are packaged, transported and distributed to shops, and eventually worn! ¹



Did You Know? (Ag Facts) ²

- Cotton has been cultivated and used to make fabrics for at least 7,000 years.
- One bale of cotton weighs approximately 480 pounds.
- Some of today's high-capacity gins can turn out as much as 30,000 pounds of clean, cotton fiber in one hour.

Discussion Questions

- How do farmers harvest cotton?
- Where is cotton grown in the United States?
- What other products are made from cotton?

Lesson Plans Available Online at

scfb.org/book-of-the-month

Grade Level(s): 3-6

Purpose: Students will learn about the production and processing of cotton and discuss the impact it has had on the history and culture of the United States.

Vocabulary:

- **boll:** the part of a cotton plant that contains the seeds; the pod or capsule of a plant
- **gin:** to separate cotton fiber from seeds and waste material
- **fiber:** thin strand of cotton that cloth is made from
- **bale:** cotton that has been pressed in to a large bundle
- **module:** massive block of seed cotton that has just been picked

Background Agricultural Connections

It's common knowledge that slavery was a source of conflict between the North and South leading up to the Civil War. But why did the South want or need slaves? Cotton. This important crop influenced the slave trade, slave culture, economic policies, the Civil War, and the industrial revolution.

Cotton picking was a job given to healthy, adult slaves. These slaves handpicked cotton in the fields all day. Then, by candlelight they would join the elderly, infirm, or children to **gin** the cotton by hand. Ginning cotton means removing the lint or fiber from the seed. The more lint one removed from the seed, the more profit could be made from each **boll**. It would have been important for slaves to remove as much lint as possible from each seed. One boll may contain anywhere from fourteen to forty-four seeds. A slave could gin approximately one pound of cotton a day, or about 120 cotton bolls.

Eli Whitney is generally credited with the invention of the cotton gin. His idea for this machine came while he was watching a cat try to catch a chicken in the barnyard. The cat's unsuccessful attempt left him with a claw full of feathers and no chicken. Whitney decided to try a similar approach with cotton, creating a gin operated by hand-crank that would rake the seeds from the fiber. In 1794, his machine was patented, revolutionizing the production of cotton. One slave could now gin fifty pounds of cotton per day. Did this mean plantation owners needed fewer slaves? No, but it did make cotton a more profitable crop because less time was required for ginning. Plantation owners now wanted more slaves to grow more cotton.

Cotton production increased across the South following the invention of the cotton gin. At the same time, factories that could process cotton were being built across the north. Unlike wool, which is a very long and scale-like fiber, cotton is a short and smooth fiber. These physical differences make wool easier to spin into thread than cotton, either by hand or by machine. Spinning cotton by hand is time consuming and difficult. Wool, and to some extent linen, was the fabric of choice until machine technology made the production of cotton thread viable. Cotton production in the South was only economical or possible with the manufacturing industry of the North. The southern economy had virtually no manufacturing and was based solely on production.

Cotton requires a long, warm growing season, meaning it cannot be grown in colder, northern climates. Today, cotton is grown across the southern United States from Virginia to California. Cotton also requires ample water but grows well in the arid southwest with modern irrigation technology. Cotton gins are now very large machines that work much faster than Eli Whitney's simple machine. What happens to all the cottonseed after it is ginned? Most of those fuzzy seeds are fed to dairy cattle or processed into cottonseed oil, which can be found in nearly every kind of snack food, including chocolate candy bars.

The Story of Cotton³

Materials:

- *From Cotton to T-Shirt* by Robin Nelson or *Journey of T-shirt* by John Malam
- [The Story of Cotton video](#)

Procedures:

(Day One)

1. Ask students if they have ever seen a cotton field. Discuss with students what products cotton helps provide for us: jeans, tshirts, money, cottonseed oil (found in many grocery store products like cereal or peanut butter), etc. Cotton is important to SC and is one of our top 10 commodities.
2. Read students the book, *Journey of a T-shirt* or *From Cotton to T-shirt*. Use discussion questions listed on first page.
3. To extend their learning, you may show the video, "The Story of Cotton". This will help students visualize the planting and harvesting of cotton. (This video is focused on TN cotton, but it's very similar to the process here in SC.)
4. Challenge students to go on a cotton scavenger hunt at home. Encourage them to bring in photographs, illustrations, or the actual objects from the following list:
 - a. A piece of sports equipment that uses 150 yards of cotton [baseball]
 - b. Something that is woven from 75% cotton and 25% linen [money]
 - c. A food product that contains cotton [ice cream, mayonnaise, salad dressing, margarine, potato chips, and more]
 - d. A common household object made of cotton [q-tips, diaper, towel, pillowcase, and more]
 - e. A piece of clothing or fabric made of cotton [T-shirt, jeans, and more]
 - f. An invention of Thomas Edison's that originally contained cotton [light bulb]
 - g. An item made from the linter, or fuzz of the cotton seed [plastics, mattresses, furniture]
 - h. Something used to decorate a home [wallpaper, curtains]
 - i. A powerful type of tape used around the home [duct tape]

(Day Two)

5. Have students take turns sharing the items they found. Invite the class to discuss and speculate on how different items from the scavenger hunt are made. For example, what part of the cotton plant do they suppose goes into ice cream? How might cotton fiber be transformed into a baseball, paper money, or a T-shirt?

6. Divide students into teams and assign each team one item made of cotton. Ask each team to conduct research into their chosen product and learn all about the process of manufacturing it, from seed to factory. Give students a suitable period of time to complete their research, such as one or two class periods. Then have teams return to class and showcase how their chosen product is made. Encourage students to be creative and to try out multimedia in their presentations, if desired. For example, student teams might:
 - a. Perform a short skit called "From Dirt to Shirt"
 - b. Illustrate a timeline that shows the process of making paper money
 - c. Write a song or a poem about "the life of a baseball"
 - d. Design a PowerPoint presentation that explains how ice cream is made with cottonseed oil
7. End the activity by having students present their learning to the class through whichever medium they chose.

What is a cotton boll?

Materials:

- Cotton bolls
- Hand lenses for observations
- African American Spirituals – [link here](#)
- Scales
- Extra pair of jeans
- Linking History and Technology handout

Procedures:

1. Help your students begin to recall their prior knowledge. Ask them to think about the Civil War. Help them identify or recall that slavery was a big part of the war. Ask them, "Why did the South want or need slaves more than the North?"
2. Allow students to offer their ideas. Use guided questions to lead them to recognize that cotton was large industry in the South. At this time, cotton was very labor intensive to grow, harvest, and process.
3. Inform students that they will be learning how cotton impacted events in American history.
4. Find a local source for cotton bolls or order the Cotton Boll Kit. Note that the cotton in these kits has a longer fiber than the cotton harvested in the 1800s.
5. Share the background information about cotton and slavery.
6. Give each student or group of students one cotton boll.
7. Have your students examine the woody stem of the cotton boll. Ask students if they can understand why it was so painful to pick this plant by hand. Would gloves have been available?
8. Share the background information about slaves and the process of ginning cotton. Have your students predict how many seeds are in each boll, and then ask them to compare it to the actual number of seeds after ginning.

9. Have students listen to songs that were sung by slaves while they performed the tedious work of ginning cotton. What cultural differences may be expressed by this music? Do we still use music to pass the time while we work? Explain that sometimes slaves were sending messages with their songs. For example, songs like “Swing Low, Sweet Chariot” could signal that the “coast was clear” and the time to escape had come. It’s important that we don’t mistake the songs as joyous because of the way they sound, as many are expressing their pent up emotions and have to mask their feelings (for safety) through the tune of the song.
10. Have your students weigh their fibers from one boll, and then compare it to the weight of a pair of jeans. A pair of jeans would be almost one hundred percent cotton (minus a zipper and a button).
11. Ask students to consider how many cotton bolls are needed to produce a pair of jeans. Share the information from the *Linking History and Technology* handout.
12. Have students examine the fiber under a hand lens or simple magnification lens. They will notice that these short fibers have almost a silky appearance.
13. Discuss the invention of the cotton gin. Ask your students how many years passed between invention of the cotton gin and the beginning of the Civil War. Did the tension between the North and the South escalate after this important invention?
14. In conclusion, remind students that cotton is still very relevant to South Carolinians today. We wear cotton and use cotton seeds in many products, so it’s important for us to understand its origin and its impact on our state.

Extension Activities:

- Visit the *Interactive Map Project* website and view the map representing Cotton Production in the United States. Identify the state that produces the most cotton, then find where your state ranks for cotton production. Many states do not produce cotton. Based upon the map, what climate does cotton grow best in?
- Share the slide show Cotton: From Field to Fabric in Forty Frames, which describes the major steps of modern cotton production and processing.

Suggested Companion Resources:

- [America’s Heartland: Cotton](#) (video)
- [Cotton Now & Then: Fabric-Making from Boll to Bolt](#) (Book)
- [Eli Whitney and the Cotton Gin](#) (Book)
- [Farmer George Plants a Nation](#) (Book)
- [If You Lived At the Time of the Civil War](#) (Book)
- [Immigration, Migration, and the Industrial Revolution](#) (Book)
- [Levi Strauss and Blue Jeans](#) (Book)
- [Mr. Blue Jeans](#) (Book)
- [Right Here on this Spot](#) (Book)
- [Roll of Thunder, Hear My Cry](#) (Book)
- [Where Did My Clothes Come From?](#) (Book)
- [Working Cotton](#) (Book)
- [Cotton Boll Kit](#) (Kit)
- [Cotton Education Kit](#) (Kit)
- [Cotton's Journey - A Field Trip in a Box](#) (Kit)

- [Cotton Reader](#) (Booklets & Readers)
- [A World of Cotton](#) (Website)
- [Cotton Campus](#) (Website)
- [Cotton Counts Educational Resources](#) (Website)
- [Cotton Gin Animation](#) (Website)

Sources/Credits:

1. Malam, John. *Journey of a t-shirt*. Capstone, 2013.
2. Utah Ag in the Classroom
3. Cottoncampus.org

Suggested SC Standards Met:

English/Language Arts:

- RI.3.5.1 Ask and answer literal and inferential questions to determine meaning; refer explicitly to the text to support inferences and conclusions.
- RI.4.5.1 Ask and answer inferential questions to analyze meaning beyond the text; refer to details and examples within a text to support inferences and conclusions.
- RI.4.8.1 Determine how the author uses words and phrases to shape and clarify meaning.
- RI.4.8.2 Apply knowledge of text features to gain meaning; describe the relationship between these features and the text.
- RI.4.9.1 Use definitions, examples, and restatements to determine the meaning of words or phrases.
- RI.5.8.1 Analyze how the author uses words and phrases to shape and clarify meaning.
- RI.6.5.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Science:

- 3.L.5: The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.
- 4.L.5: The student will demonstrate an understanding of how the structural characteristics and traits of plants and animals allow them to survive, grow, and reproduce.
- 5.L.4: The student will demonstrate an understanding of relationships among biotic and abiotic factors within terrestrial and aquatic ecosystems.
- 6.L.5: The student will demonstrate an understanding of the structures, processes, and responses that allow protists, fungi, and plants to survive and reproduce.

Social Studies (2020):

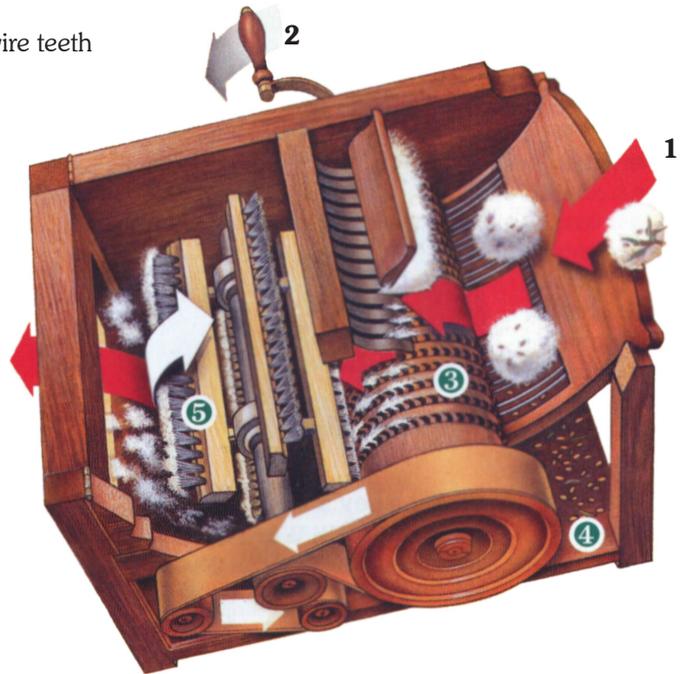
- 3.2.2.ER Identify and analyze the ways people interact with the physical environment in different regions of the state, the country, and the world.
- 3.4.2.HS Investigate the economic and land use characteristics of places and regions around the world.
- 4.3.CX Contextualize South Carolina's role in the development of sectionalism during the antebellum period.

- 4.4.CO Compare the economic and political causes of the Civil War.
- 4.4.CC Identify and evaluate the economic, political, and social changes experienced throughout the Civil War.
- 4.5.E Analyze multiple perspectives of the economic, political, and social effects of Reconstruction on different populations in the South and in other regions of the U. S.
- 5.1.CX Contextualize how the Second Industrial Revolution led to an increased desire for raw materials and the United States involvement in imperialistic efforts and economic expansion.
- 5.5.CX Contextualize the changes in rural communities in South Carolina within national and global industries.
- 6.4.CX Contextualize the environmental impact of the Industrial Revolution.

Linking History and Technology

Understanding the Cotton Gin

1. Cotton bolls, made up of fiber and seeds, are fed into the cotton gin. The arrows show the path of the cotton through the gin.
2. As the handle is turned, the cylinder and brushes rotate.
3. Wire teeth catch the cotton bolls and pull them through narrow wire slots.
4. The seeds that are too large to pass through the slots fall to the bottom of the gin.
5. Rotating brushes pull the cleaned cotton from the wire teeth and sweep it out of the gin.



What can you make from a bale of cotton?

One bale of cotton weighs about 480 pounds and is about the size of your refrigerator.

From that bale, you can make:

215	Pairs of jeans
409	Men's sport shirts
690	Terry bath towels
765	Men's dress shirts
1,217	Men's t-shirts
3,085	Diapers
4,321	Mid-calf socks
313,600	\$100 bills

