INVENT
An African American Inventors Curriculum

THE OHIO STATE UNIVERSITY EXTENSION
INVENT: An African American Inventors Curriculum

Development of this project was made possible through a grant from the Ohio 4-H Foundation; OSU Extension, Southwest District; and OSU Extension, Urban Programs.

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For-sale publication

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TDD No. 800-589-8292 (Ohio only) or 614-292-1868
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Introduction

The African American Inventors curriculum uses George Washington Carver, African-American scientist, teacher, and inventor, as a role model for creative problem-solving, invention, creative thinking, and analysis. As an inventor, his vast achievements contributed greatly to the scientific, educational, and economic advancement in the United States.

The curriculum is designed to encourage 4th through 8th grade youth to develop creative and critical thinking skills, to encourage young people to view themselves as inventors and problem-solvers, to increase youth's awareness of African-American history and cultural pluralism, and to comprehend and apply scientific principles in everyday life.

The African American Inventors, funded through a grant from the Ohio 4-H Foundation, is a partnership of Ohio State University Extension County, District and State 4-H Youth Development Staff, Ohio State University Extension Urban Program Specialists, Ohio State University College of Education, and local 4-H volunteers and school teachers.

We know about the basketball, football, baseball, and other greats in sports. The African American Inventors Project curriculum is a unique series of lessons to help youth learn about the contributions African-Americans have made in other areas of society.

African-American inventors have been responsible for groundbreaking contributions that have changed the world through their ingenious display of creativity and inventiveness. Through George Washington Carver and other noted African-American inventors, young people will be introduced to a variety of inventors who made their dreams a reality and who sought to solve a problem in a different way.

George Washington Carver (1859–1943) spent much of his time reading, studying, and drawing plants and animals. He traveled to another part of Missouri to go to a school that would accept African-American children. He later went to high school in Kansas. He had a strong desire to learn and always had several jobs while going to school.

Carver eventually went to the Iowa Agricultural College, where he studied plant chemistry. He later became a professor at the Tuskegee Institute in Tuskegee, Alabama, where he worked for the rest of his life.

Carver experimented with the chemicals in plants to make many useful products. He invented more than 300 products from peanuts, more than 100 from sweet potatoes, and hundreds more from other plants and plant products. In addition, Carver is credited for publishing informational bulletins that provided farmers with valuable tips. He was considered a researcher and educator, experiment station advocate, and early extension agent through his work with Farmers' Institutes and Fairs. Indeed, George Washington Carver looked at something and was able to see beyond the ordinary to the extraordinary. He was able to see a problem and see beyond what is to what might be and did something about it.

The African American Inventors curriculum is designed to help young people look at something that is already there and make something new out of it—an important skill for an inventor. The following activities will help youth develop this skill.
• **Brainstorming:** free flow of thoughts and ideas
• **Finding multiple uses:** everyday objects, brainstorm all possible uses
• **Problem solving:** problem discussed in small groups to find solutions and then critique various solutions (Appendix: Lesson 2 Worksheet)
• **Reading:** youth are encouraged to read as many sources on inventors and how to invent
• **Probing questions:** ask open-ended questions to ensure more than a yes or no response
• **Flow charting:** map out steps necessary to create an invention for logical thinking and visual prompting

Some points to consider/ponder conducting the lessons include:

• Why something was invented
• The trial and error of inventing things
• How the inventions were put into use/marketed

Educators/teachers are encouraged to use these techniques throughout the African American Inventors lessons to help youth develop their creative, critical thinking, problem-solving skills. The accompanying lessons use the whole language concept of communications: reading, writing, listening, observing, illustrating, experiencing, and doing. In addition, the lessons cut across the school curriculum and reinforce the teaching of basic life skills.

The learning activities in each lesson module may be arranged in “activity station/learning station” format to facilitate individual performance and creativity, for example;

**Super Machine**

Provide several pieces of white 8 1/2” x 11” paper along with the following directions.

**Super-Machine — A new kind of dominoes**

Draw your version of a super-machine. Your drawing must take up the entire piece of paper and be able to be joined to either end of the supermachine that has been created by other people.

Make your drawings original, detailed, and neat. When you are finished, put your name on the back of the drawing and tape it (along the back side) to one side of the supermachine that has been drawn by other people.

When all drawings are joined together, you will have a long mural-like drawing of a machine. Each section should fit with the ones next to it.
Matching Game

Make cards that have the name of an invention on one card and its inventor on another card. Write numbers in the corner of each card so that each inventor-invention pair has the same number.

Youth take the deck of cards and turn them face down on a desk. They then take turns turning over two cards. When they can turn over two cards that match (an invention and inventor) they place the pair in their pile. The person with the most pairs at the end of the game wins.

Examples of cards would be:
1. Thomas Edison 1. electric light bulb
2. Wilbur and Orville Wright 2. airplane

Categories

Make several cards out of tag board or other heavy, durable paper. Write one of the following headings on each card.

Inventions that were “premature”
Inventions that were “mistakes”
Inventions that are especially beneficial to people
Harmful inventions
Inventions that were a result of teamwork
Inventions that made BIG changes in the world
Inventions that are needed for the future
Inventions that brought people close together
Small inventions that made a big difference

Laminate cards and attach the following instructions:

Research information about inventions. When you find an invention that will fit into one of these categories, write its name on the appropriate card with the special marking pen.
Things To Do With Junk

Provide youth with a box of “good” junk. Also provide cards with the following instructions:

1. Choose at least 10 items from the box.
2. Arrange the items in some sort of a logical group or sequence.

Junk Card 1
1. Choose at least 10 items from the box.
2. Arrange the items in some sort of a logical group or sequence.

Junk Card 2
1. Choose two things from the box.
2. List all of the ways they are alike and ways they are different.
3. Think of a new invention you could make by combining the items or by changing one item to include one attribute of the other item.

Junk Card 3
1. Choose one thing out of the box.
2. List all of the attributes, uses and features of your item.
3. Suggest ways you could change this thing or use it in a new way.

Junk Card 4
1. Select ten different things from the box.
2. Make as many of the following things in one hour as you can:
   a) something useful in measuring
   b) something used for communication
   c) a trap for a pest
   d) something useful in a classroom
   e) some kind of shelter
   f) a container for mud
   g) a plaything for a small child
   h) something that can sail through the air for 15 feet
   i) something that can spin
   j) something that represents you
   k) a musical instrument

Time Line

Make a long strip of paper that is 6” wide and as long as is necessary to accommodate the time scale you choose. Make a straight line along the length of the strip and mark off time intervals of every 50 years, beginning with 3,000 BC and continuing to the present. Instruct youth to mark the date of inventions on the time line at the appropriate place.

After dates of invention have been added to the time line for about two or three weeks, post the time line and discuss when most inventions were invented and why most inventing took place during these times.
Connections

Divide a piece of tag board into squares. Cut out pictures of several different objects and glue each one into a square. You should have at least twenty pictures. Provide small markers in two different colors. Write the following directions for the game.

This is a game for two players. Each player should choose a color of markers. The first player tries to make a connection between any two pictures by telling how they are related. You can say things like, “they are both containers, they are made from the same materials, they are both alive, they can both be found in a bedroom, etc.” If a connection can be made, a marker is placed on both pictures. The next player must make a connection between the last object named and any other object that does not have a marker on it. If a connection can be made, a marker is placed on the object that does not have a marker on it. If a connection cannot be made, the player must pass. The person who has captured the most objects is the winner.

Invention Quilt

Provide youth with squares of white paper (approximately 7” x 9”). Each youth should choose a different invention. On the top portion of the paper, they should make a drawing of the invention and a brief historical account. When squares are finished, mount each one on a different color of construction paper and tape them together to form a quilt. Hang in the classroom or in the hall for all youth to read.
Headlines

Tack several pieces of newsprint on a bulletin board. On each piece of paper, write some headlines from newspapers of the future that deal with invention events. Provide youth with pieces of paper to write the news articles to accompany each headline. They may also draw a picture to go with the article. As articles are written, they are mounted under the corresponding headlines. When you are finished, you should have several pages of a newspaper of the future. Some possible headlines are:

- Invention Aids Blind
- Revolutionary New Material
- Invention Speeds Communication
- Artificial Body Parts Improved
- New Hope for Terminally Ill
- Inventor of the Year Award
- Car of the Future, Here Today
- New Invention Makes Housework Easy
- New Process for Recycling Garbage
- The Latest Computer Developments
- The Invention Everyone Hoped For
- Invention Offers Hope for Starving Nations
1. Youth brainstorm words related to ideas that come to mind when they see/hear a word/phrase.

2. Brainstorming guidelines include:
   - no judging of ideas
   - all ideas are acceptable
   - may piggyback on someone else's ideas
   - no discussing of ideas
   - individuals may pass

3. Using a long strip of butcher paper/spacious chalkboard, ask the youth to list as many words/phrases that have something to do with the word, topic, or subject designated; for example, characteristics/qualities of an inventor.

4. Keep youth stretching into new areas by suggesting examples and categories of ideas.

5. Using the list of words as recorded, have the youth create word trees—word webs—mind maps.

6. Example:

   ![Diagram of word trees](image)

   Teacher/Leader
   Have youth complete the blank “web” form on pages 112 & 113

7. Blank “web” forms may be found in the Appendix: Introduction.

8. Have youth create more complex “webs” until they have used all the words listed.

9. Youth may construct “web mobiles” to conclude this process.

10. Supplies needed would include: paper punch, string, tape, construction paper, magic markers, scissors. Display mobiles throughout the room.
To introduce “The African American Inventors Curriculum” to the youth, you are encouraged to do the following activity with the group:

1. Have youth compile a “list of words” that they think describe an inventor; compare results.
2. Have youth draw a picture of an inventor; compare results.
3. Have youth construct an inventor using modeling clay; compare and share results.
4. There is no right or wrong answer. Summarize that inventors come in all sizes, shapes, colors, and are unique just like each of the youth in the group.

Supplies needed:
- Modeling clay for each youth
- Paper
- Pencils/markers/crayons

To identify traits of creative people and to illustrate the point that these same characteristics are often common to everyone.

1. Ask the group members to think of some friends or colleagues that they consider to be creative people. (In the event that participants seem to have difficulty identifying acquaintances, it is acceptable to list other well-known creative people, for example, Walt Disney.)
2. Have them write down the names of two or three people that fit that category, and then next to the name of each person, write what that particular person does that makes him or her creative.
3. These resources could include such things as “always asking questions” or “always willing to take a risk” or “daydreams a lot.”
4. Following this individual activity, form groups of four or five participants to compare and contrast the names and qualities of creative people.
5. As you look over your individual lists, how many of those listed were male? Female? Tall? Short? Older? Younger? Make the point that physical conditions typically have no correlation with creative abilities.
6. What are some of the traits or qualities your friends have that make them creative? Could you learn these qualities?
7. Have you seen cases where friends show creativity even though it is not reinforced?
8. How does one become creative?
George Washington Carver
Brief History (1864–1943)

Dr. George Washington Carver helped to revolutionize Southern agriculture and received world acclaim for his contributions to agriculture. The peanut industry of today is due to his development of more than 300 products from peanuts.

The most amazing fact of Dr. Carver is the way in which he overcame enormous prejudices and poverty as he struggled from a nameless African-American child to George Washington Carver, B.S.; M.S.; D.Sc; Ph.D.; Fellow of the Royal Society of Arts, London; and Director of Research and Experiments at Tuskegee Institute, all without a trace of bitterness, with total indifference to personal fortune, and with thoughts only of how to make the world a better place for all people.

Dr. Carver never married, saying he would not subject a woman to the hours that he worked. His wants were simple. When he started at Tuskegee in 1896, his salary was $1,000 a year; when he died on January 5, 1943, his salary was $1,500 a year. He turned down many raises, saying he didn’t need money. He never accepted a penny from his many developments or for visiting farms to teach the farmers better agricultural methods.

While he received many titles during his 47 years at Tuskegee, his true avocation was teaching. He had the ability to guide his students to discover their own potential and the potential of the world around them.

As a youth, he was known only as “Carver’s George” in the town where he was born. Born into slavery, George had no last name until he left the farm at the age of nine to go to school. He was told to change his name to George Carver.

Dr. Carver shared this about his boyhood:

As nearly as I can trace my history, I was about two weeks old when the war closed. My parents were both slaves. Father was killed shortly after my birth while hauling wood to town on an ox wagon.

I had three sisters and one brother. Two sisters and my brother I know to be dead only as history tells me, yet I do not doubt it as they are buried in the family burying ground.

My sister, mother and myself were kucklucked (sold as a group), and sold in Arkansas, and there are so many conflicting reports concerning them I dare not say if they are dead or alive. Mr. Carver, the gentleman who owned my mother, sent a man for us, but only I was brought back, nearly dead with whooping cough, with the report that mother and sister were dead, although some say they saw them afterwards going north with the soldiers.

My home was near Neosho, Newton County, Missouri, where I remained until I was about 9 years old. My body was very feeble and it was constant warfare between life and death to see who would be master.

From a child, I had an inordinate desire for knowledge, and especially music, painting, flowers and the sciences, algebra being one of my favorite studies.
Day after day, I spent in the woods alone in order to collect my floral beauties, and put them in my little garden I had hidden in brush not far from my house, as it was considered foolishness in the neighborhood to waste time on flowers ...

There was no opportunity for a young African-American youth to get an education in Diamond, Missouri, where George was born, but he thirsted for knowledge. When he went with Moses Carver, the man who owned his mother, to Neosho, and he saw African-American children reciting their lessons at Lincoln School, he knew he had to go to school. He was only nine when he left the little log home where he lived and went to Neosho to start his education.

He was lucky that a kind family took him in so that he could attend school. He soaked up knowledge like a sponge, and by the time he was about thirteen, he had learned all Lincoln school could teach him.

When he heard some African-Americans say they were moving to Fort Scott, he saved every penny he could, and when he had enough to carry him through a term, he enrolled in school again. He allowed himself a dollar a week to live on, and studied by candlelight to satisfy his craving for knowledge.

Probably the biggest disappointment in his life was when he enrolled in Highland College, Highland, Kansas, was accepted, then when he reported on the first day they turned him away because he was an African-American. He was deeply depressed, but finally determined not to let that stop his education.

He drifted for a while, then moved to Winterset, Iowa, where he enrolled in Simpson College in 1890, making certain they knew he was African-American. He was accepted—the only African-American out of 300 students.

George Carver studied piano and painting at Simpson College. He continued his painting after he transferred to Iowa State Agricultural College in Ames, Iowa, in 1891. He was not happy in the beginning at Iowa State. He was the only African-American in the school and he wasn’t permitted to live in the dormitories with the other boys. Instead, he lived in an office the school converted for his use. Because of there being another George Carver enrolled in the school, it was at this time that he added “Washington” to his name to avoid any confusion with the other youth.

But he soon made friends. His fellow students so admired his paintings that they tried to convince him to show his “Yucca and Cactus” at the Chicago World’s Fair. When he said no because he did not have the clothes to wear, the boys “kidnapped” him, took him to a store, bought him a suit, then put him and his paintings on a train for Chicago. His painting won Honorable Mention out of hundreds on exhibit.

Later, at Tuskegee, Professor Carver collected rocks of many colors which he pulverized with a flat iron to a suitable powder to make beautiful paints; from the native Alabama clay he made paints ranging from white and pale cream through rich yellow ochre and Indian red. While he was at Tuskegee Institute, his many award-winning paintings were painted using these homemade colors.
Dr. Carver was a man of many talents. After George Carver received his Bachelor of Agriculture degree at Iowa State in 1894, his teachers felt that he showed great promise and wanted him to continue his education.

At his teachers’ urging, Mr. Carver enrolled in the Iowa State Master's program and was appointed to the faculty as an assistant in biology, which enabled him to teach freshmen courses.

As a graduate student, George was just as impressive as he had been as an undergraduate, performing his work under the guidance of L. H. Pammel, a noted expert on plant diseases and fungi.

Mr. Carver collaborated on several scholarly articles, and proved a popular teacher with his students. In fact, he might well have stayed at Iowa State as a faculty member (the only African-American teacher there)—which was what the other teachers wanted him to do—if it had not been for his ever-growing feeling that he should do something more to help other people of his race.

In April 1896, just after he finished his M.S. degree at Iowa State University, he received a letter from Booker T. Washington, the young educator who had been struggling to get Tuskegee Institute on its feet. Washington and the Board of Trustees had decided that the school, founded in 1881, needed an Agricultural Department, since 85 percent of the African-Americans in the state were farmers. And what better person to head up that department than George Washington Carver, the only African American in the nation to have a masters degree. Mr. Carver was then serving as an instructor at Iowa State, a white university.

George Carver had been offered positions at two other colleges, but for him there was not a decision to make. “Why,” he exclaimed excitedly, “this has been God's plan for me all along.” His friends at Iowa State could not bring themselves to try to keep him there, much as they wanted to.

From the beginning, Professor Carver spent every spare moment he could away from the classroom, visiting the farmers in the region to instruct them on how to benefit from what God had given them. He developed what he called “The Jesup Wagon,” which was really a rolling classroom. His rolling farm school was so successful, the idea was soon adopted by the U.S. Department of Agriculture, and later put to use in several foreign countries.

Professor Carver had 13 students in his first class at Tuskegee— 75 the next semester! After that his classes were always filled.

Tuskegee Institute had very little money to equip his laboratory, but that didn’t discourage Professor Carver and his students. They scrounged from the city dump and anywhere they could for materials to make their own lab equipment. He told his students, “Start where you are with what you have. Make something of it and never be satisfied.”

Dr. Carver started worrying about the future of cotton when the boll weevil crossed into Texas from Mexico about 1904. He was also worried that the cotton, planted on the same land year after year, was depleting the soil of its nutrients. It was a race to see which would ruin the crops first— the boll weevil or poor farming methods.

Dr. Carver started talking with farmers about a crop to replace cotton— the peanut—a crop they knew since they raised small patches of the “ground peas,” as some called them, both to eat and as hog food. They listened to Dr. Carver and planted acres of peanuts.
One lady planted almost 2,000 acres. But when those acres were harvested, she and the other farmers found there was no market for their crop. The peanuts used in the United States at that time were mostly cheap imports raised in China and processed in Japan. It was a sad time for the farmers and for Dr. Carver. The farmers had gambled their year's earnings on the peanut and lost. And Dr. Carver felt responsible.

Dr. Carver worried about the farmers whom he had persuaded to plant peanuts, because of a lack of a sufficient market for the nuts when they were harvested. Being a very religious man, he retired to “God's Little Workshop” (his laboratory in Rockefeller Hall) to wrestle with how to accomplish the seemingly hopeless task of creating a market. He told the following little story about his experience while meditating in his lab:

I asked the Great Creator what the universe was made for. ‘Ask for something more in keeping with that little mind of yours,’ he replied. What was man made for?

Little man, you still want to know too much. Cut down the extent of your request and improve the intent.” Then I told the Creator I wanted to know all about the peanut. He replied that my mind was too small to know all about the peanut, but He said He would give me a handful of peanuts. And God said, ‘Behold, I have given you every herb bearing seed, which is upon the face of the earth—to you it shall be meat.’

I carried the peanuts into my laboratory and the Creator told me to take them apart and resolve them into their elements. With such knowledge as I had of chemistry and physics I set to work to take them apart. I separated the water, the fats, the oils, the gums, the resins, sugars, starches, pectoses, and amino acids. There! I had the parts of the peanuts all spread out before me. I looked at Him and He looked at me. ‘Now you know what the peanut is,’ He said.

“Why did you make the peanut?” I asked.

The Creator said, ‘I have given you three laws; namely, compatibility, temperature, and pressure. All you have to do is take these constituents and put them all together, observing these laws and I will show you why I made the peanut.’

I therefore went on to try different combinations of the parts under different conditions of temperature and pressure and the result is what you see.”

After Dr. Carver separated the peanut into its various parts in his lab, he concentrated on developing useful products from those parts. He found that the peanut was a storehouse of wonders, and that when he combined its parts under various temperatures and pressures, many curious and uncommon forms poured in a never-ending stream—peanut brittle, peanut candy bars, roasted and salted peanuts, a dozen beverages, mixed pickles, sauces, meal, instant and dry coffee, salve, bleach, wood filler, washing powder, metal polish, paper, ink, plastics, shaving cream, linoleum, shampoo, axle grease, and synthetic rubber, just to name a few of the more than 300 products developed.

The peanut is 32 percent oil. The oil particles, Dr. Carver found, lack the gelatinous membrane common to animal fat; hence a hydrogenator or catalyzer could be used to reduce the peanut oil to oleo. The fat globules could be broken to produce milk which contained all the elements of cow's milk, being low only in calcium.
Milk produced from peanuts proved to be truly a lifesaver in the Belgian Congo in the 1930s. Cows could not be kept there at that time because of the leopards and flies, so if a mother died, her baby died soon after because there was nothing to nourish it. Missionaries fed the babies milk made from peanuts and they flourished!

Dr. Carver developed more than 300 products made from peanuts. But how to market them was the question.

He made a kit in which he carried his products in many bottles. He carried his kit to county fairs and to visit the rich and famous—industrialists, governors, representatives, and senators—always demonstrating his products, trying to create a market for peanuts.

The market for peanuts improved dramatically and, in 1918, when World War I was well underway, Dr. Carver had become such a well-known agriculturalist that the U.S. Department of Agriculture had begun consulting him for ways to overcome the wartime food shortages. Because of his fame as an agriculturist and as a scientist, the Peanut Growers Association asked him to speak to the prestigious Congressional Ways and Means Committee in Washington about the peanut's value, and about the need for the government to support the new American peanut industry.

It was unusual for an African-American to appear before a congressional committee. They gave him only ten minutes to make his presentation—hardly enough time to unpack his sample case. But when he started talking they wouldn't let him stop. He spoke for more than an hour, and, as he departed, a hearty round of applause echoed through the room.

Because of his presentation, the committee increased the tariffs to where the American farmer could compete in the marketplace.

From the world around him Dr. Carver found a use for almost everything. From native clay he fashioned pots; from the same clays he extracted pigments which were used to make paint to paint the local church—the same paint he used to execute his own paintings on canvas. From throw-away string and burlap he made exquisite needlework, and from bark and fibers he wove mats.

From the world around him he found utility—and from utility he created beauty. His greatest accomplishment, however, was that he took time to teach his students his many skills.

When Dr. Carver started his long search for a market for the peanut, he met Henry Ford and demonstrated to him his many developments. From that meeting the two struck up a friendship that was to last for the remainder of Dr. Carver's life.

When the Carver Museum was opened at Tuskegee in 1941, Henry Ford and his wife were there to dedicate the museum.

A replica of Dr. Carver's Cabin where he was born is in Greenfield Village, a group of historic buildings in Dearborn, Michigan.