



***Stereotypical Scientists Unearthed:
Will the Real Scientists Please Stand Up!***

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This curriculum unit is recommended for:
Kindergarten through 5th Grade, Science

Keywords: Stereotypes, real, science, identity, mythical, image, minority

Teaching Standards: See [Appendix 1](#) for teaching standards addressed in this unit.

Synopsis: Images surround us. Companies have catchy logos, individuals utilize symbols or fancy initials, and teams have mascots. All of these are ways in which an individual or group can be identified. Images can have a positive connection or a negative one. What happens when a group is assigned an image that is negative or does not correctly speak for each individual within it? How can those individuals disconnect from those negative images? This unit is for anyone who would like to help students build a positive image of who a scientist is or can be. Students will engage in various activities that will help encourage them to develop or broaden their image of who scientists are. Students will have the opportunity to compare society's idea of a scientist with their own. This unit will encourage students to develop their own image to see themselves as scientists and not solely rely on society to do so for them.

I plan to teach this unit during the coming year to 110 students in third grade. This unit will be integrated with Social Studies, Science and Language Arts.

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Stereotypical Scientists Unearthed: Will the Real Scientists Please Stand Up!

DeNise Y. Gerst

Introduction

Barringer Academic Center is a National Magnet School of Excellence located on the west side of Charlotte, North Carolina. BAC, as it is affectionately called, is an elementary school in the Charlotte Mecklenburg School District and serves students in grades K-5. Currently BAC has approximately 550 students enrolled. Though most of the students are African American, BAC does have a diverse population which includes Caucasian, Indian, Hispanic, Asian and Multi-race students.

A variety of clubs are offered throughout the school for all grade levels to enhance students' learning experiences beyond the classroom. Clubs meet during designated times before and after school during the week. Some clubs such as Science Olympiad, Chess, Cyber Kids, Chorus and Odyssey of the Mind offer students the opportunity to compete with their peers regionally and statewide. Our students have also competed in the Fire and Safety Bowl in previous years.

Students in the third through fifth grades have the opportunity to serve on our school student council. Students in grades four and five who have outstanding academic records are invited to be inducted into the national honor society.

Barringer is a unique school. Though it is a magnet school, not all of the students are a part of the magnet program. Barringer is one school comprised of four different programs. Our Horizons program is a program created by The Charlotte Mecklenburg School District to enhance the learning of students working two or more grade levels above their own. Currently this program serves approximately 25 students. Individuals who desire to be a part of the Horizon's program must fill out an application, engage in a series of tests and complete an interview. They are then invited into the program if they qualify.

BAC's gifted program serves students in grades K-5 who are working above their current grade level. K-2 students who are working at an accelerated pace can apply to be placed in a learning immergent class. Students who are certified as gifted (grade 3-5) can apply through the Charlotte Mecklenburg Schools lottery to be placed at our school. These students are grouped heterogeneously in talent development, gifted, classes. Students who are a part of the Horizon's or gifted program generally come from areas that are out of our school's zone. BAC also serves approximately 350 students that live in the neighborhood surrounding the school. The majority are students who are working at or below grade level which do not qualify them to participate in the Horizon's or gifted programs. Many of these students are also economically challenged.

Though Barringer has multiple programs, every student comes to the science lab once a week for 45-60 minutes with their class. The Science lab is offered as a special area class. Students engage in center learning, group work, and project learning. Each week, students

choose a center to work in. Students are not permitted to choose the same center week after week. This ensures that they are experiencing a variety of learning. Each center is aligned to the common core/essential standards for grades K-5. At times students also participate in a class experiment. This is usually when the experiment need more teacher direction.

All students are also required to participate in a school-wide Science Fair held the second week of January each school year. Students work individually, in pairs, as a group or as a class to complete a project. The students follow the scientific method in the development of their projects. Judges, not affiliated with our school, are invited in to interview the students and judge the projects using a rubric for the students, grades 3-5, who have completed an individual, partner (pairs) or group (3 people) project. The top 12 projects are sent to the regional Science Fair held at the University of Charlotte each February.

As the Science Facilitator, I serve every student at BAC. I have been challenged to build a comprehensive science department that builds confidence in students who previously did not have much exposure to science and to challenge students who come with a vast background of science knowledge. My challenges also extend to breaking down a mindset that only *some* students are able to engage in science experiments. Breaking this mindset has not been easy. I have taught my students that everyone is able to engage in science experiments and inquiry, not just some students. When I first arrived, many of my students were shocked that they would have the opportunity to engage in scientific experiments. Students who were previously disinterested in science have now become fascinated with it.

I still find myself challenged with providing better examples of scientists from all cultures. I desire to help my students see themselves as scientists and not just White or Indian males.

Content

Rationale

As a child growing up I was not presented with the idea that African Americans could be scientist or any other positive role model. The closest idea I had of any African-American science was NASA astronaut and physicist Ronald McNair. I didn't grow up with others who looked like me so I relied on my parents and the world beyond to identify with. Sadly, what I was presented with, by the media, were stereotypes. I had no interest in being a rapper or an R & B Diva. Yet that is what I saw in the media more than anything else. There were no "hidden figures" (1) for me to glean from. Fortunately, my parents made certain that I was exposed to ideas beyond what the news and even some of my teachers and counselors said was possible for me. Being a part of Jack and Jill of America, Incorporated (2) and attending one of the largest and oldest black churches in Arizona, exposed me to black dentists, physicians, attorneys, pilots, judges, ministers, and educators.

Many of my students do not have the same opportunities as I had and only see what is presented throughout the media and in school. Although there is nothing wrong with a student having a goal to be a professional athlete, they should be made aware other professions exist. My personal belief is that students with these goals should also have an academic goal. My reason for this belief is that most athletic careers do not last long. Students should have

something to focus on when their athletic career ends if there are fortunate to make it that far. I have found that many students of color are only expected to be able to play a sport. Their academic ability is often overlooked or thought to be non-existent altogether. While stereotypes are still very prevalent, I feel it is important and my duty to expose to positive role models they may otherwise not see.

As a science teacher, I am challenged with helping my students understand that scientists not restricted to Caucasians and Indian males. Even with breakout shows like *The Big Bang Theory* (3), minorities are underrepresented. Though some progress has been made, it is overshadowed by the blaring media stereotypes. I desire to present relevant lessons to my students that they can truly make a connection with. The students of today must be able to see the opportunities that are available to them and not feel restricted because they represent a minority group. In the beginning of each school year I ask my students who they feel a scientist is and what they do. My kindergarten students draw what a scientist looks like and what they do. My kindergarten students draw what a scientist looks like while my older students describe who they feel a scientist is. There is an overarching representation of Caucasian males drawn and described. It is my goal to help change some of this dialogue beginning with the lessons presented in my classroom. Though one seminar cannot correct decades of misconceptions, it is a start.

Objectives

The purpose of this unit is to reframe the thinking of students as it relates to how minorities are portrayed in the media. It is my belief that students have been inundated with negative images in the media that portray minorities in an unfavorable light.

After watching the documentary *Ethnic Notions* (4), I am more aware of the layers of stereotypes that have been fed to the public over several decades. It is alarming to believe that so many stereotypes, specifically those of ignorance, being docile, inability to think critically, laziness, over exaggerated silliness, among others, have continually been seen as reality. My goal for this unit is to tackle some of those stereotypes for my students by presenting them with images of individuals of color who are successful in other professions besides music and sports. I want to help my students build a knowledge base of successful individuals in the fields of Science, Technology, Engineering and Math (S.T.E.M.) that are women or from ethnic backgrounds. It is not my intent to bash Caucasian S.T.E.M. leaders. I personally feel they are already well represented and would like to show my students other individuals who are underrepresented.

For my younger students I would like to begin to build an understanding that they can achieve and become whoever they want to become. Although they too have experienced stereotypes, they have not had as many years of exposure as my older students. For this reason I would begin their unit by having them identify who a scientist is.

My hope for all of my students is for them to have a new way of thinking when they think of who a scientist, or a person in the S.T.E.M. field is or can be. I would like to introduce my older students to Discovery Education's Young Scientists Competition. This competition is for students in grades 5-8. As a culminating part of this unit, I would like for students who have an idea they would like to submit, to do so. I will help them record their two minute video and

upload it. My point for doing this would be to help students see they have unlimited potential. I would also like to bring in young college students who are pursuing degrees in S.T.E.M related fields. My goal is to set up a mentoring group for a few of my students. As the group becomes more established, I would like to open it up to more students.

Since the classes I teach are hands on, it would not benefit my students if I only presented the material in a lecture format. I would also like for my students to be the “real scientists” that stand up (as the title of my unit states). Another goal for this unit is to have my students actively participate. Each year my school hosts a S.T.E.M. night. I would like for my students to create a few of the stations that the families will visit that night. This would give them to opportunity to become the real scientists and hopefully spark a deeper appreciation for S.T.E.M. I wish for them to help unearth the stereotypes that currently exist in our world.

Images

Images have a powerful impact on our unconscious mind. In her YouTube video “Killing Us Softly IV” (5), Jean Kilbourne shows the power of imagery in advertisement. Through multiple examples, she shows her audience how women are sexually objectified and used to sell clothing, food and basically anything humans use. She further explains how women are used repeatedly to sell merchandise by accentuating their physical features. Most times, these images are airbrushed leaving the woman with an unrealistic features. The problem with these images are that they cause young girls to have an unhealthy fascination with an image that is unreal. These unreal expectations can lead to low self-esteem and eating disorders due to young women and men not being able to obtain the “ideal” image.

Imagery is so successful in selling products companies use logos to familiarize the public with their product. Once a company successfully brands itself it can be easily recognized by its logo alone. Quizzes on how well you know company logos can be readily found online (6).

How someone, or a group of individuals, is portrayed can play heavily on how others view them. The documentary “Ethnic Notions” mentioned earlier is a prime example of how media can misrepresent a group.

Teaching Strategies

I will give the students an assessment prior to beginning this unit. The students will take the same assessment at the culmination of the unit. I will compare the results and see if they have changed (See Appendix 3).

One of the strategies I will use is the Taba format. This format allows students to generate ideas based on a specific theme. In this unit the Taba lesson will be used to help students generate ideas for the theme scientist. It is a critically thinking format and is often used with gifted classrooms. Using this format gives students the opportunity to think beyond the surface.

I will allow students to draw their own image of what they think a scientist is. This strategy will be used to help students frame their own idea of who a scientist is. This will help replace any stereotypes they may have already encountered. We will revisit these images at the end of the unit. This will give the students a chance to see if their idea of who a scientist is has changed.

Students will participate in a wax museum. The purpose of this wax museum is to frame their thinking and help students realize they can become anything they would like to be regardless of what negative stereotypes have been portrayed in the media.

The students will use creative writing to rewrite the story “No Mirrors in My Nana’s House” by Yasye M. Barnwell (7). The idea is for students to write a story about what the world would be like without stereotypes.

I will encourage student creativity by asking students to create a center for our family science night held in April. The centers students create will be offered as a station families can visit during the event.

Students in grade 5 will have the opportunity to submit a video to Discovery Education on an idea to help solve a real world problem. Each year Discovery Education hosts a Young Scientist Challenge. Students are able to submit a two minute video sharing an idea to solve a real world problem. The target audience re students in grades 5-8 (8).

Activities

Activity 1: Pre-Assessment

The students (grade 2-5) will take a brief pre-assessment on who they think a scientist is. This assessment will be taken again at the culmination of this unit and the results will be compared.

Activity 1: Who is a scientist?

I will present students with the question “Who is a Scientist?” Students will be prompted to respond to the question using adjectives they think describe a scientist. This lesson will be done using the Taba format (See Appendix 2).

Activity 2: Draw a Scientist

Using the adjectives and data from activity 1, students will draw what a scientist looks like. I will not give a pattern to the students. This will be their own interpretation. The students will share their created images to the class and share why they drew their scientist the way they did.

Activity 3: Bias

Present students with an image of a minority dressed questionably (See Appendix 4) Students will respond to the picture by answering the following questions:

1. What does this say?
2. What makes you say that?
3. What else can you say about this?

As a group we will discuss responses.

I will then present students with a follow up portrait of the same person dressed as a business person. The students will respond using the questions previously presented. As a group we will discuss how these two portraits of the same person portrayed the person in different lights and why that is.

Activity 4: Storytelling

The students will listen to the book “No Mirrors in my Nanas House” by Ysaye M. Barnwell. The story can be found on Storyline Online (8)

The students will share their ideas on what a world without mirrors would look like. The teacher will try and get students to draw the conclusion that a world without mirrors would possibly allow more unity rather than negatively focusing on differences among each other. The students will then write their own story with their interpretations on how a world without stereotypes will look like.

Activity 5: Dreams and Desires Wax Museum

The students will share what they would like to be when they become adults. They will prepare a short speech as their future selves. The students will prepare a wax museum and invite other classes in the school. When a person comes to their station the students will recite the speech they prepared as their future self.

Activity 6: I am a scientist

The students will create three stations for our science night in April where they will serve as guest scientists for the evening. The purpose of this activity is to help students see themselves as scientists. Too often minorities and women are not portrayed as scientists. This activity will help dispel that myth.

Activity 7: Discovery Education

This activity is for students in grades 5 only. I would like for my students to brainstorm solutions to real world problems. Each student will choose one solution and record a two minute video and submit it to Discovery Education Young Scientists (9). I would like my students to see themselves as scientists and reframe their thinking about who a scientist is.

Activity 8: Post-Assessment

The students will take the same assessment they took at the beginning of this unit. Once the responses are collected, I will compare the results and share them with the students. The purpose of activity is to determine if students have grown in their idea of who a scientist is.

Summary

This unit has been designed to help reframe students' ideas on who scientists are. It has been designed to help students who desire to be a scientist know that it is possible regardless of gender or ethnicity. At the culmination of this unit, students should have a positive image of themselves.

Appendix 1

Objectives

CCSS.ELA-LITERACY.RL.3.6

Distinguish their own point of view from that of the narrator or those of the characters.

CCSS.ELA-LITERACY.RL.3.7

Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story (e.g., create mood, emphasize aspects of a character or setting).

3.H.1 Understand how events, individuals, and ideas have influenced the history of local and regional communities.

Appendix 2

Example of a Taba lesson

Name: _____ DeNise Gerst

Teaching/Learning Model(s): Taba (Final Draft) Concept
Development

Generalization(s) to be Developed in the Lesson

Systems promote effective function

I. Concept (ONE word!):

Systems

II. Data:

The students will expand their knowledge of systems and how they function and change.

The teacher will use chart paper and different colored sticky notes to facilitate the lesson.

V. Evaluation of Students

Objective(s)	Criteria	Method
The students will make generalizations about systems.	The students will write generalizations about systems without re-listing information previously discussed.	The students will write generalizations about systems in their science journals.

V. Relationship to Other Activities in the Unit

Activities Prior to Lesson	Relationship to Purposes
This is the opening lesson for a unit on body systems	The students will establish prior knowledge of systems.
Activities After Lesson	Relationship to Purposes
The teacher will listen to student responses	The teacher will pause 5 seconds before speaking

<p>without repeating back answers.</p> <p>The teacher will listen to student responses without giving praise or passing judgement.</p> <p>The students will give support for their answers.</p>	<p>again.</p> <p>The teacher will thank each student for participating.</p> <p>The teacher will follow up with “why” question after each student response.</p>
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V. Teacher Evaluation of Lesson

<u>Objective</u>	<u>Criteria</u>	<u>Methods</u>
<p>The teacher will review all groups with the class.</p>	<p>The teacher will require students to give reasoning for their subsuming of groups.</p>	<p>The teacher will ask “how do the groups you chose fit together?”</p>

Cognitive Map

<u>Possible Data</u>	<u>Possible Groups and Labels I</u>	<u>Possible Subsuming</u>	<u>Possible Groups and Labels II</u>
Body cities Schools Government Stores Streets Races Eco (systems) Planets Weather land	Living Non-living Environment Controlled	Environment under Non-living Controlled under Living	Systems that happen in nature Systems that are people created.
Actual Data: Pipes (2) Sewer Closet River	Toilet stuff Back and forth Let's flow Round and round To survive Moving things	Round and round and back and forth under Moving things Games under currents	We ran out of time (after two sessions). I only see each class once per week.

Body	Games	Environment under studying	Possible:
Moon	Currents		
Earth	Studying		Systems that happen in nature
Heart	Environment	Toilet stuff under Let's flow	Systems that people created
Brain(2)			
School			
Panthers			
Wings			
PS4			
Call of Duty			
Electronics			
Clock			
Solar system			

Appendix 3

Pre and Post Assessment

1. Science is generally for males.
 - A. Strongly Agree
 - B. Agree
 - C. Neutral
 - D. Disagree
 - E. Strongly Disagree

2. Women are well represented in science.
 - A. Strongly Agree
 - B. Agree
 - C. Neutral
 - D. Disagree
 - E. Strongly Disagree

3. I can name at least 4 minority scientists.
 - A. Strongly Agree
 - B. Agree
 - C. Neutral
 - D. Disagree
 - E. Strongly Disagree

4. Science is a diverse career.
 - A. Strongly Agree
 - B. Agree
 - C. Neutral
 - D. Disagree
 - E. Strongly Disagree

Suggested Reading List for Teachers

- “For White People Who Teach in the Hood: And the Rest of Y’all Too” by Christopher Emdin.
- “Hidden Figures” by Margot Lee Shetterly (for both educators and students)
- “The Immortal Life of Henrietta Lacks” by Rebecca Skloot (for educators)
- “Ethnic Notions” documentary
- “Gender Roles in Media” (blog post) by Allison Lantagne
- “On the gender–science stereotypes held by scientists: explicit accord with gender-ratios, implicit accord with scientific identity” (article) by Fredrick L. Smyth and Brian Nosek

Suggested Reading List for Students

- “Jaden Toussaint, The Greatest (all 5 episodes) by Marti Dumas
- “Nelson Beats the Odds” by Ronnie Sidney II
- “No Mirrors in My Nanas House,” by Yasye M. Barnwell
- “Sugarplum Ballerinas” by Whoopi Goldberg
- “Salt in His Shoes” by Michael Jordan

Endnotes

1 Hidden Figures by Margot Lee Shetterly

2 Jack and Jill of America is a youth group for African American youth ages 2-19 that teaches them about their heritage.

3 “The Big Bang Theory” is a popular sitcom about scientists and their friends. It has successfully aired on CBS

4 Ethnic Notions. California newsreel, 1987

5 Killing Us Softly IV by Jean Kilbourne

6 Logos quiz <https://www.sporcle.com/games/g/corplogos>

7 “No Mirrors in My Nana;s House” by Yasye M. Barnwell

8 “3M Young Scientists Challenge” Discovery Education: www.discoveryeducation.com

9 Storyline Online: www.storylineonline.com

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This book is for children and walks readers through life with no mirrors. The main character shares her experience of how she views herself due to not having mirrors.

Emdin, Christopher. *For White Folks Who Teach in the Hood ... and the Rest of Y'all Too Reality Pedagogy and Urban Education*. Beacon Pr, 2017

Professor Christopher Emdin shares ideology on effectively teaching students who do not fit the non-indigenous profile. He stresses the importance of connecting with students by intentionally connecting with them in a way they understand. This book can help the reader understand how attempting to group students into what has been considered the ideal image (Caucasian) can negatively impact their self-image and hinder their learning.

Ethnic Notions. California Newsreel, 1987

This documentary walks viewers through how media plays an important role in how society views a group of individuals. It further helps viewers gain an understanding of offensive stereotypes that have been presented in the media for generations.

Killing Us Softly. Performed by Jean Kilbourne

In this documentary Jean Kilbourne gives multiple examples of how advertisers sexualize women to sell products. She explains how powerful imagery is and how it has affected how young women view themselves.

Shetterly, Margot Lee., and Jan Smit. *Hidden Figures*. HarperCollins, 2017

In this book three prominent African American women are highlighted who had previously been "hidden" in history. This book was made into a movie (released in 2017) and has helped transform the idea of who is and who can be a scientist.