

| STAGE 1 – DESIRED RESULTS | |
|--|---|
| <p>Unit Title: <i>Social Justice: Biases and Stereotypes in Science Education</i></p> <p>Established Goals:</p> <ul style="list-style-type: none"> • Students will identify biases and stereotypes within the field of science • Students will investigate how these biases stereotypes are learned • Students will explore own learning experiences in their education • Students will identify own biases and stereotypes • Students will recognize that everyone is a scientist • Students will construct a lesson, using the Minnesota Academic Standards K-6: <i>Nature of Science & Engineering, Physical Science, Earth & Space Science, Life Science</i> | |
| <p>Understandings: <i>Students will understand that-</i></p> <ul style="list-style-type: none"> • Biases and stereotypes exist and are learned about science/scientists • Our learning experiences shape our identity, perceptions, biases, stereotypes, and beliefs • Power, money and white privilege play a role in our learning experiences • As students learn about their world through science, they are acquiring a sense of what is fair and just • Social justice can be taught through inquiry • Bridging standards based science instruction to the lives of students is one way to create a more equitable and just science learning community • We are all scientists, therefore, everyone is a part of the science learning community | <p>Essential Questions:</p> <ul style="list-style-type: none"> • Are prejudice and bias created? How? • Can prejudice be overcome? • What are your responsibilities in regard to social justice issues? • Can literature be used as leverage to create social change? • What factors can cause an imbalance of power within a society or culture? • Do you think power has anything to do with social justice? Why do you think that? • What choices do you have in regard to social justice? • Does stereotyping have an influence on how we may perceive our world? • How is “prejudice” created? • Is power an illusion? • Who has the power? • Can the color of our skin be invisible? |
| <p>Students will know:</p> <ul style="list-style-type: none"> • We are all scientists, regardless of differences in culture, gender, socio-economic status, religion. • Our learning experiences shape our identity, perceptions, biases, stereotypes, and beliefs. Teachers must examine these nuances and how this may impact their teaching and ultimately, their students’ lives. • Everyone plays a role in the science learning community. • Each individual contributes to new discoveries as a problem solver and decision maker. Therefore, it is important that representation of all voices are heard equally for the best interest of our world. | <p>Students will be able to:</p> <ul style="list-style-type: none"> • Demonstrate competency in constructing a standards based, K-6 socially just science lesson plan K-6, utilizing their understanding of their students’ lives, within a diverse classroom setting |

STAGE 2 – ASSESSMENT EVIDENCE

Performance Tasks:

- Draw a Scientist (Jay)
- My Science Timeline: Self reflection
- “Take Away Sticky Note” identifying biases and stereotypes in science
- “Quick Write” identifying where the student may be in regard to the video activity and generate ideas why they believe people are in different places. After the video, students will elaborate upon their answers in a different color.
- Participation in modeled lesson plan
- Individually create a lesson plan using a children’s book to infuse social justice into teaching science based standard.
- Make copies of lesson plan to share with each member within the class (for teaching science resource binder). Students will do a book talk about the selected children’s book and also demonstrate their “mini lesson”, including the activity they would use to teach to within their own field experience.
- Reflection paper addressing how the essential questions. Students must show growth over time from the start of the unit to the end of this unit (answers are in two different colors).

Other Evidence:

- Students demonstrate critical thinking and social consciousness through course discussions and are actively engaged.
- Students are respectful of others opinions and respond appropriately to social justice topics.

Key Criteria:

- Must meet the SCSU lesson plan requirement.
- Must include appropriate children’s book and activity to infuse social justice into a standard based science lesson.
- The lesson needs to demonstrate the connection to their students’ real life events.
- Appropriate extension activities for differentiation/modification to address the various learning styles and abilities within a diverse classroom.
- Demonstrate critical thinking and transformative growth over time regarding social justice issues and why it is essential to include in the science content area.

STAGE 3 – LEARNING PLAN

Summary of Learning Activities:

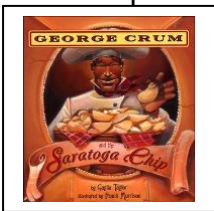
Day 1:

1. Using paper and crayons provided (including “multicultural” colors), the students will be asked to draw a picture of a scientist to display in the classroom. (Explain the importance of ownership to students’ classroom/lab, establishing a community of learners and purpose for doing any activity/experiment in science).
2. Students share pictures one at a time at the doc cam, while instructor record a group tally on a Smartboard slide of male/ female, color of skin, wearing a white lab coat, beakers, crazy hair, glasses, science lab setting (or other) etc.
3. Students hang up their picture of a scientist on the bulletin board when they are done sharing.
4. THINK. PAIR. SHARE. Explain thinking with table groups, why they chose to represent the scientist the way that they did. Share whole group.
5. Discuss and brainstorm (whole group) who else can be a scientist and record responses on another Smartboard (astronaut, engineer, chef/cook, hair stylist, farmer, teachers, children, etc...) Students will learn that science is all around and we are all scientists.
6. Read the children’s book: *Girls Think of Everything: Stories of Ingenious Inventions by Women* by Catherine Thimmesh and Melissa Sweet



Book summary: “In kitchens and living rooms, in garages and labs and basements, even in converted chicken coops, women and girls have invented ingenious innovations that have made our lives simpler and better. Their creations are some of the most enduring (the windshield wiper) and best loved (the chocolate chip cookie). What inspired these women, and just how did they turn their ideas into realities?”

7. Discuss: How might this be viewed if written from the perspective of “Boy’s Think of Everything”.
8. Book preview George Crum and the Saratoga Chip by Gaylia Taylor

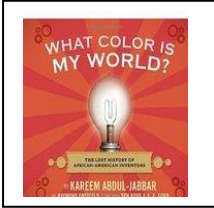


Book summary: An account of the life and career of George Crum, a biracial chef who is credited with the invention of the potato chip at a Saratoga Springs, New York, restaurant in 1853. Based on historical records.

9. Display essential questions and hand out a copy for each student. Revisit on an on-going basis each class period is round table discussions.
10. Index Card Summaries/Questions. Summarize the “Big Idea”. Something about science biases you don’t understand. (p. 248, Wiggins & McTighe)

Day 2:

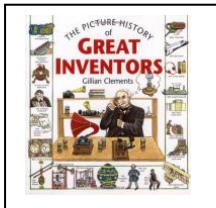
11. Build upon prior knowledge that we are all scientists. Science is all around us.
12. Brainstorm some famous inventions or scientists (example of common answers- Benjamin Franklin)
13. Read (preview) children's book: *What Color is My World* by Kareem Abdul-Jabbar and Raymond Obstfeld to pique students' interest and expose myths of notable inventors that have been "overlooked".



Kareem Abdul-Jabbar, basketball legend and the NBA's alltime leading scorer, champions a lineup of little-known African-American inventors in this lively, kid-friendly book.

Did you know that James West invented the microphone in your cell phone? That Fred Jones invented the refrigerated truck that makes supermarkets possible? Or that Dr. Percy Julian synthesized cortisone from soy, easing untold people's pain? These are just some of the black inventors and innovators scoring big points in this dynamic look at several unsung heroes who shared a desire to improve people's lives. Offering profiles with fast facts on flaps and framed by a funny contemporary story featuring two feisty twins, here is a nod to the minds behind the gamma electric cell and the ice-cream scoop, improvements to traffic lights, open-heart surgery, and more - inventors whose ingenuity and perseverance against great odds made our world safer, better, and brighter.

14. Read children's book: *The Picture History of Great Inventors* by Gillian Clements



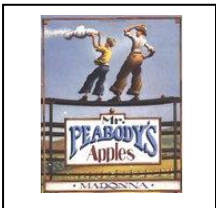
Book summary: "An entertaining and well-researched introduction to the great inventors of the world, this book contains facts, both serious and comic. Spanning a period of thousands of years — from the unknown inventor of the wheel to the research teams at work today on space and computer technology — author Gillian Clements presents a splendid celebration of the ingenuity of people throughout history. Young readers learn about the motivations, struggles, and achievements of such inventors as Leonardo da Vinci, Isaac Newton, Benjamin Franklin, Alfred Nobel, Thomas Edison, Alexander Graham Bell, Orville Wright, Albert Einstein, and many more."

15. Interactive Read.Write.Think Venn Diagram comparing/contrasting the between the two books.
16. Students will use their devices to explore the website: The Black Inventor Online <http://blackinventor.com/> and record their findings.
17. Ask students guiding questions, "What inventions/discoveries surprised you? Why? Were you able to expose any assumptions or myths that you learned in school or from television?" "How might this have changed your perspectives if you had learned this in elementary school vs. today?" "Tell me more about that."

18. My Science Timeline: Students will create a timeline of memories they have of using science at various stages in their life on a blank sheet of paper. This includes formative years, P-12 learning experiences, and other experiences outside of the school setting. If they are positive memories they record the experience above the line; if negative memories, they record it below the line.
19. Students will be asked questions such as: Why might their experiences be positive or negative. How did their friends, family and teachers impact their learning experiences? Why might some find difficulties remembering learning science in school? Were there certain activities that were more meaningful than others? If so why? Are there common themes/trends amongst the group? How do perceptions and biases play into your learning? (example: SOME STUDENTS PERCEIVE DISSECTING A FROG AS NEGATIVE WHILE OTHERS AS POSITIVE)
20. Share out their learning experiences whole group and explain if positive or negative.
21. Who, What, When, Where, Why, How Headings accordion foldable: students select a color of cardstock and create an accordion by folding into thirds, then in half (to create six equal columns for headings on both sides). Students write about the experiences that had the most impact (at least one positive on one side and one negative on the other side). Students will hand these in at the end of class.
22. Discuss: How might this information impact your teaching?
23. Round table discussion of essential questions.

Day 3:

1. Yesterday we discussed your learning experiences and memories in science, think about how your perceptions were different from others.
2. Read the children's book: *Mr. Peabody's Apples* by Madonna



3. Discuss how assumptions and misunderstandings affect our perceptions. Discuss how rumors spread, how others saw Mr. Peabody.
4. Piggy Back Discussion Starter Question- Have you ever been or know of someone that may have been judged based off assumptions? Students continue to share and/or ask questions piggy backing off of ideas shared.
5. Show YouTube video "What is Privilege?", (activity only) while watching, student will place an X on the sheet of lined notebook paper for representing steps forward (have more than 50 books in your house...) or steps backward (afraid of, embarrassed of...), ("What is privilege?," n.d.) Students will write a reflection upon where they ended up in comparison to the students in the video, classmates and why they feel they ended up where they did.
6. Talk Walk: Students must stand and walk around the room sharing their discoveries with at least three different people.
7. Show the remainder of the YouTube video "What is Privilege?" (the students responses/reactions to the activity in video),
8. Discuss whole group thoughts, observations, questions about the video. Did anything surprise or shock you?

9. Show photos of scientists and inventions/discoveries. First show only white male inventors of various time periods.
10. Matching Game: show white, black and brown male and female scientists- students must match up the invention/discovery with the right person.
11. Show students the correct answers with pictures and captions of each invention/discovery.
12. Whole group discussion: What might you infer based of your predictions and the correct answers?
13. Round table discussion of essential questions.
14. Sticky Note Take Away "The Big Idea".

Day 4 & 5:

1. Show the YouTube Video: The Power of an Illusion (from ED 637)
2. Have students read the *Just Science* article and synthesize new information together with a partner.
3. Model an elementary science activity, Grade 3 Life Science "Living things are diverse with many different characteristics that enable them to grow, reproduce and survive". Standard 3.4.1.1.1.1, "Orange Peel".

Each student is given an orange and asked to get to know their orange by looking for identifying marks (shape, brightness, size, texture, etc.) They put their orange in a large laundry basket. The basket is then placed in the center of the room. The students are asked to identify their orange and take it out of the basket. This should be fairly easy for students. Students exchange oranges with a partner and peel the orange and place it into the basket again. After the oranges are mixed up by the instructor, the students are to select his/her orange.

Discuss why it was difficult to find their orange without the skin and how the oranges were the same on the inside. Ask guiding questions as to how this activity could be used as an analogy for teaching social justice.

4. Read the children's book about individuality, culture and diversity to class: "*We are all Alike, We are all Different*" by Laura Dwight



"We are all alike...we all have hearts and brains. We are all different...we do not think or feel the same way."

An important lesson for children, by children. *We Are All Alike... We Are All Different* celebrates the multitude of differences in our society — at a time when understanding tolerance and diversity have never been more important. Written by children for children, *We Are All Alike... We Are All Different* reinforces multicultural and anti-bias learning and appreciation.

With original drawings and their own lyrical words, a class of kindergartners share the ways they look and feel, the games they play, the foods they like, the homes they live in, and the families they live with, concluding that "We are all alike. We are all different. We are a family."

5. Have students read the *Just Science* article and synthesize new information together with a partner.
6. Discuss text to real world connections about the orange activity and beyond the classroom.
7. Begin Discussing Lesson Plan. Provide time for collaboration in class.
8. Teach students how to read and apply the science standards in their lesson plans.
9. Group students by field experience grade levels (K, 1-2, 3-4, 5-6)
10. Students are asked in advance to complete and share their Context for Learning, edTPA template. This includes the number of students, boys/girls, rural vs. urban, socio-economics, diversity within the classroom, ELL, special needs, accommodations, gifted and talented, etc.
11. Groups will brainstorm approaches to include various age appropriate “social justice” activities into their lesson plan, based off of the varied contexts of learning, student interests, and community resources (electronic devices allowed).
12. Students will follow the rubric and create a lesson plan/activity in each (select one standard area) Science Standard area and share with the class.
13. After students are done teaching, revisit their initial answers in round table discussion of essential questions. Ask them, Did your answers change? Why? What was the catalyst for the change?
14. Students complete reflection paper about reflective questions.

Sources

The black inventor online museum | Profiles on African American and black inventors over the last 300 years. (n.d.). Retrieved from <http://blackinventor.com/>

Cochran-Smith, M. (2004). *Walking the road: Race, diversity, and social justice in teacher education*. New York: Teachers College Press.

Creating Classrooms for Social Justice | Edutopia. (n.d.). Retrieved from <http://www.edutopia.org/blog/creating-classrooms-for-social-justice-tabitha-dellangelo>

Darder, A. (2012). *Culture and power in the classroom: Educational foundations for the schooling of bicultural students*. Boulder: Paradigm Publishers.

Do you have a racial bias? [Video file]. (n.d.). Retrieved from <https://www.youtube.com/watch?v=cykcpqSpVZo>

Dwight, L., & Cheltenham Elementary School (Cheltenham, Pa.). (1991). *We are all alike-- we are all different*. New York: Scholastic.

Education world: 10 social justice activities for students. (n.d.). Retrieved from
http://www.educationworld.com/a_lesson/social-justice-activities-students.shtml

Flores, C. J., & Luschen, K. V. (2014). *Crafting critical stories: Toward pedagogies and methodologies of collaboration, inclusion and voice*. Teacher College Press: New York.

<http://amazon.com/>. (n.d.) images

<http://nsfnoyce.org/>. (n.d.). Retrieved from <http://nsfnoyce.org/files>

Iran protests Hajib ban - The New York Times. (n.d.). Retrieved from
http://goal.blogs.nytimes.com/2011/06/05/iran-protests-hajib-ban/?_r=0

Jay, J. (n.d.) Science Instructional Methods Course Activities, St. Cloud State University.

Just science | Teaching tolerance - diversity, equity and justice. (n.d.). Retrieved from
<http://www.tolerance.org/magazine/number-44-summer-2013/just-science>

Kennedy's class blog | Just another wordpress.com weblog. (n.d.). Retrieved from
<https://kennedysclass.files.wordpress.com>

Outreach: Teaching science and social justice. (n.d.). Retrieved from
<http://www.asbmb.org/asbmbtoday/201403/Outreach/>

Race - the power of an illusion. (n.d.). Retrieved from
<https://www.youtube.com/watch?v=Y8MS6zublaQ&list=PLt6nX4f8WjdWgeomQQ3oLzVH5EoahlcQB&index=1>

Rubrics. (n.d.). Retrieved from <http://www.greececsd.org/district.cfm?subpage=1369>

Science. (n.d.). Retrieved from <http://www.education.state.mn.us/MDE/EdExc/StanCurri/K-12AcademicStandards/Science/index.htm>

Socially just science - The new Atlantis. (n.d.). Retrieved from

<http://www.thenewatlantis.com/publications/socially-just-science>

Spotlight on inventors | TIME for kids. (n.d.). Retrieved from

<http://www.timeforkids.com/node/30456/print>

Taylor, G., & Morrison, F. (2006). *George Crum and the Saratoga chip*. New York: Lee & Low Books.

Thimmesh, C., & Sweet, M. (2000). *Girls think of everything: Stories of ingenious inventions by women*. Boston: Houghton Mifflin.

Using photographs to teach social justice | Teaching tolerance - diversity, equity and justice.

(n.d.). Retrieved from <http://www.tolerance.org/lesson/using-photographs-teach-social-justice>

Venn diagram – Read.write.think. (n.d.). Retrieved from

<http://www.readwritethink.org/classroom-resources/student-interactives/venn-diagram-30973.html>

Valenzuela, A. (2016). *Growing critically conscious teachers: A social justice curriculum for educators of Latino/a youth*.

Venn diagram - Readwritethink. (n.d.). Retrieved from <http://www.readwritethink.org/classroom-resources/student-interactives/venn-diagram-30973.html>

What is privilege? (n.d.). Retrieved from <https://www.youtube.com/watch?v=hD5f8GuNuGQ>

The whole child podcast — Whole child education. (n.d.). Retrieved from

<http://www.wholechildeducation.org/podcast>

Wiggins, G. P., & McTighe, J. (2005). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.

Design Topic: Social Justice
Grade(s): K-6 Elementary Education Majors

Subject: Instructional Science Methods
Designer: Cassie Froemming (some activities adapted with permission from Dr. Jay)