Professional Development Workshop for Kindergarten Teachers to recognize their unconscious bias towards gender in STEM Education

By Jodie F. Bray

A project submitted in partial fulfillment of the requirements for the degree of Master of Arts in Education: Natural Science and Environmental Education

Hamline University Saint Paul, Minnesota Submission Date August 2018

Primary Adviser: Laura Halldin
Secondary Advisor: Rellen Hardtke
Peer Reviewer: Angela Goebel
# TABLE OF CONTENTS

- Project Overview ................................................................. 2
- Project Description .............................................................. 3
- Intended Audience ................................................................. 4
- Activity 1.1 Baseline ................................................................. 5
- Activity 1.2 Creating a space to have courageous conversations .......... 9
- Activity 1.3 Understanding the lens in which you perceive the world .......... 12
- Activity 1.4 Identifying the Cycle of Socialization and how it relates to gender as well as correlates to implicit bias test .................................................. 16
- Activity 1.5 Distinguishing the difference between gender and sex ............... 19
- Activity 1.6 Interpreting how gender unconsciously determines choice ............ 26
- Activity 1.7 Correlating Female Kindergarten teachers unconscious bias to the STEM pipeline ................................................................. 30
- Activity 1.8 Building a box of tools to reflect on equity for personal growth ......... 32
- References ..................................................................... 36
Project Overview

The intent is to help bring awareness to the Cycle of Socialization as it pertains to female elementary teachers and their unconscious bias to the STEM pipeline. My concern suggests the fears and doubts that female teachers have at the elementary level are being projected onto their students. My hope proposes that if elementary educators can recognize their unconscious bias, they may have courageous conversations to stop the cycle of oppression and provide young females the grit and strength to feel they belong in order to be the best they can be! Are kindergarten teachers aware of their unconscious bias in STEM (Science, Technology, Engineering and Math) education towards gender? My research aims to create a workshop for elementary teachers to recognize their own unconscious bias towards gender equity in STEM. Through their learning, elementary teachers may help female and male students recognize that gender is fluid in order to promote gender equity, and, in return, give young males the courage to stand up for equity. My goal is to increase awareness and understanding for gender equality in elementary classrooms.

I will be using Knowles’s (1980) modern practice of adult learning: Andragogy. Andragogy is based on the assumptions that, in order to be effective, teachers must explain to adult learners their reasons for teaching specific skills; learners must know “why.” Effective instruction also involves the learner in solving real-life problems (Knowles, 1980). I will also be integrating Project Based Learning (Dewey, 1889) in order to have learners take on an active role in the learning process and use their prior skills, knowledge, and experiences to construct, design, and develop solutions to problems typically encountered in real-world scenarios (Savery, 2006).
**Project Description**

The goal of this workshop is to raise awareness of the unconscious thoughts educators may have about gender roles and how that affects their students STEM pathway of education. The activities are not only designed to raise awareness and increase knowledge, but to foster courageous conversations about gender and equity as well as how female kindergarten teachers may be projecting their own bias onto students. This is a workshop to help and aid in the discussion of how and what educators can do to get more young women in STEM classrooms with the intent to foster enough self efficacy in students to pursue their own dreams.

The activities that are included in the workshop lead the participants through an experience to first recognize what bias they may have towards gender. Emphasis is placed on the introspection of the individual to understand the lens in which they see the world. Participants will move towards identifying what the differences are between sex and gender with the intent to erase labels and allow students to be human in the social institution of public school. The final plan is to lead participants toward the deconstruction of the Cycle of Socialization so that teachers may meet the needs of all students interested in STEM.

Following Knowles four principles of adult learnings, this workshop is meant to guide the learners through an assortment of activities to stimulate and build on participants prior experiences. The workshop also provides problem centered activities that impact participants in their day to day job in the classroom.
Intended audience

The intended audience for the workshop is humans that identify as females who teach in public elementary schools with a focus on the kindergarten level. The intent of only having humans that identify as female is to create a space where participants will feel comfortable to express fears in a non-oppressive setting and not be judged implicitly or explicitly based upon their gender, sex, nor their sexual orientation.
Activity 1.1 Baseline

Audience:
Humans that identify as Female Kindergarten Teachers

Materials:
Laptop with internet access

Goals:
To assess teachers baseline understanding of their unconscious/implicit bias towards gender.

Background information:
The implicit association test was developed by three psychologists, Anthony Greenwald (University of Washington) Mahzarin Banaji (Harvard University), Brian Nosek (University of Virginia), in 1995 as laboratory tool to gain a better understanding of the unconscious mind and humans thoughts towards particular groups of individuals. According to the Teaching Tolerance website, “The Hidden Bias Tests measure unconscious, or automatic, biases. Your willingness to examine your own possible biases is an important step in understanding the roots of stereotypes and prejudice in our society.” https://www.tolerance.org/professional-development/test-yourself-for-hidden-bias , hence the reason the workshop starts with this test. The implicit association test examines the participants unconscious thoughts.

Lesson Prep:
Ensure that each participant has a device and there is internet connection.

Activity:
Introduce your participants to the following web site:

Once the participants have taken the test, they will be asked to take a screenshot to save results for later. Results are not to be shared until later in the workshop, and only if participants feel comfortable sharing.

**1st step**: Read through the preliminary information, once participants have them click onto:

I wish to proceed. (figure 1)

*Figure 1. The ip address that leads you to the implicit bias test.*

https://implicit.harvard.edu/implicit/selectatest.html
2nd Step: On this page click on the blue tab titled, Gender- Science IAT. (figure 2)

Figure 2. This page identifies different tests that are used to measure different biases.

https://implicit.harvard.edu/implicit/selectatest.html
Step 3: The test will begin and ask you a series of questions about your demographics. Feel free to decline to answer a question if you so prefer. (figure.3).

![Questionnaire](image)

Figure 3. *This is an example of the series of questions that lead you through the test.*

Step 4:

Once the participants have completed the test, have them take a screenshot of their results for later in the workshop. The results are for the participant. However, if participants feel comfortable sharing outcomes, they may. Please look at the figure below (figure.4)

![Debriefing](image)

Figure 4 is *once the participant has completed the test and their results.*
Activity 1.2 Creating a Space to have courageous conversations

**Audience:**
Humans that identify as female kindergarten teachers

**Materials:**
Paper
Writing utensils

**Goals:**
To establish group norms and a culture of respect so all participants feel valued.

**Background information:**
In order to have courageous conversations, the facilitator has to create a space where every voice can be heard and acknowledged. Humans need to feel safe and secure in order to put themselves in a vulnerable conversation. (Alinsky, 1972)

“Change means movement. Movement means friction. Only in the frictionless vacuum of a nonexistent abstract world can movement or change occur without that abrasive friction of conflict (Miller & Pedro 2006).” A respectful classroom needs to be a place where all students feel physically and emotionally safe and valued for who they are. Students who do not feel safe and valued will find it impossible to learn.

**Lesson Prep:**
Background research to know who will be participating in the group. When exploring your audience, you must not assume anything about the nature of your audience. The cultivation of the word respect has multiple meanings throughout different cultures. It is imperative to provide a space where individual humans feel respected in order to create change.

**Activity:**
This activity is very simple, however, the dialogue of the conversation may become complex. The objective of this conversation is to establish a respectful place for conversation, thus participants may not agree but the goal is reach a deeper understanding of different perspectives of one simple word; Respect.

1) Have teachers individually right down what the word Respect means to them. Ask them not write their names on the paper so it is anonymous.

2) Collect their answers. On the whiteboard or a large sheet of paper, write down the main themes that reside within the participants answers. Make them big a bold enough for all participants to see.

3) After everyone's ideas are posted, open it up for discussion using these guidelines adopted from edchange.org:

   http://www.edchange.org/multicultural/activities/groundrules.html

   1) “Listen actively -- respect others when they are talking.”

   2) Speak from your own experience instead of generalizing ("I" instead of "they," "we," and "you").

   3) Do not be afraid to respectfully challenge one another by asking questions, but refrain from personal attacks -- focus on ideas.

   4) Participate to the fullest of your ability -- community growth depends on the inclusion of every individual voice.

   5) Instead of invalidating somebody else's story with your own spin on her or his experience, share your own story and experience.

   6) Be conscious of body language and nonverbal responses -- they can be as disrespectful as words.”
4) Once you as the facilitator feel that every voice has been heard, create a new list of what the word Respect means to your audience in the room. If all the participants agree to the terms and the description of what Respect means, have each individual sign the list and keep it posted throughout the workshop. As courageous conversation occur and disagreement could arise, please refer back to the list that is posted regarding the definition of Respect so that all participants feel safe to express their ideas and thoughts.
Activity 1.3 Understanding the lens in which you perceive the world.

Audience:
Humans that identify as female kindergarten teachers

Materials:
Pencil and paper

Goals:
Personal narrative of who you are and the lens in which individuals see the world.

Background information:
Sanville (2003) believes that teachers and administrators need to be mindful of their own biases and to consider the contexts of children’s lives, and to inquire about what we are teaching our students.

One of the foundations to create change is recognizing the lens in which you, the participant, see the world. Teachers must recognize how their own personal journey affects the way they teach and how that is projected onto their students. If teachers are unaware of their own unconscious / implicit biases, they may be sending those biases within that message towards gender normative behavior in STEM fields. This experience leads teachers through a process called self-introspection; the path to exam why a human may have thoughts and feelings about one’s own thinking.

To help aid in and demonstrate the process with the audience, I will share my story and the adversity I have encountered as being part of a culture that would label my career path as “non-traditional female roles” in order to create a sense of vulnerability for others.
An example of a story that facilitators could use in their workshop if they do not feel comfortable sharing. Jerrie Mock, The First Woman to Fly Solo around the World, can be purchased at the following website and the review is listed: https://www.amazon.com/Jerrie-Mock-Story-Biographies-Readers/dp/0821422162

“In this biography for middle-grade readers, Nancy Roe Pimm tells the story of Geraldine “Jerrie” Mock, the first woman to fly solo around the world. In her trusty Cessna, The Spirit of Columbus — also known as Charlie — she traveled from Columbus, Ohio, on an eastward route that totaled nearly twenty-three thousand miles and took almost a month. Overcoming wind, ice, mechanical problems, and maybe even sabotage, Mock persevered.

Mock caught the aviation bug at seven years old, when she rode in a Ford Trimotor plane with her parents. In high school, she displayed a talent for math and science, and she was the only woman in her aeronautical engineering classes at Ohio State University. Although she then settled into domestic life, she never lost her interest in flying. What began as a joking suggestion from her husband to fly around the world prompted her to pursue her childhood dream. But the dream became a race, as another woman, Joan Merriam Smith, also sought to be the first to circle the globe.

Even though Mock beat Smith and accomplished what her heroine Amelia Earhart had died trying to do, her feat was overshadowed by the Vietnam War and other world events. Now, Pimm introduces Mock to a new generation of adventurers.”

**Lesson Prep:**

Photocopies made of (figure 1)

Purchase story as needed
Activity:

Have participants fill out the following worksheet (figure 1):

1) In the middle of the circle write your name.

2) In the square boxes, list a single word that defines who you are. For example: mother, teacher, runner, etc.…

3) Once you are done with the descriptor words, write a short paragraph about each descriptor word and what that means to you in your daily life.

(Figure 1)
Activity 1.4 Distinguishing the difference between gender and sex

Audience:
Humans that identify as female kindergarten teachers

Materials/Resources:
Copy of the article listed below
A group of humans that identify as members of GLBTQA community and females in STEM
PFLAG

Goals:
Understanding gender, sex and sexuality

Background information:
Non-binary

According to the American Sociological Association, “Like gender, sexuality is not just biologically constructed, but is shaped by social and cultural factors. Empirical research on sexual identity and behavior reveals such great variations. Sociologists refer to multiple sexualities rather than a single sexuality,” (2017) making gender just as fluid as sexuality. The first reports published on this topic, Sexual Behavior in the Human Male (1948) by Alfred Kinsey and Wardell Pomeroy, used the Kinsey Scale (Figure 1) to show the sexuality continuum:
**The Kinsey Scale:** A scale used to rate sexuality.

![Kinsey Scale Diagram]

**Rating | Description**
0 | Exclusively heterosexual
1 | Predominantly heterosexual, only incidentally homosexual
2 | Predominantly heterosexual, but more than incidentally homosexual
3 | Equally heterosexual and homosexual
4 | Predominantly homosexual, but more than incidentally heterosexual
5 | Predominantly homosexual, only incidentally heterosexual
6 | Exclusively homosexual
X | No socio-sexual contacts or reactions

*Figure 1.* The Kinsey Scale. (Kinsey & Wardell, as cited by Weinrich, 2014)

This scale challenges the commonly accepted binary thinking of 2 types of sexuality: heterosexuality and homosexuality. Fineman (2010) notes that emotionologies—political, social, and cultural constructs of emotion—shape the values accorded to specific occupational groups. Cultural assumptions have been created with the belief that if a woman is an engineer, she is automatically coined as being a lesbian. This fear of a label may lead some young woman to not want to pursue a career in engineering. Because others have taught them that being a lesbian is wrong, they do not want that label upon them. The purpose of this lesson is to explain to participants the differences of the terms, gender, sex and sexuality in order to embrace the spectrum of students that come into their classroom.

**Lesson Prep:**

**Activity:** Participants read the following article from the Teaching Tolerance website while using the Question the Author reading strategy. After the reading, share out and reflect on how this affects young women in STEM. [https://www.tolerance.org/magazine/summer-2015/sex-sexual-orientation-gender-identity-gender-expression](https://www.tolerance.org/magazine/summer-2015/sex-sexual-orientation-gender-identity-gender-expression)

1) What is gender? What is sex? Using the following reading strategy,
Question the Author (QtA) is a comprehension strategy that requires students to pose queries while reading the text in order to challenge their understanding and solidify their knowledge (Beck et al., 1997).

Beck et al. (1997) identifies specific steps you should follow during a QtA lesson:

1. Select a passage that is both interesting and can spur a good conversation.
2. Decide appropriate stopping points where you think your students need to delve deeper and gain a greater understanding.
3. Create queries (questions to encourage critical thinking) for each stopping point.
   1. Ex: What is the author trying to say?
   2. Ex: Why do you think the author used the following phrase?
   3. Ex: Does this make sense to you?

2) What is sexuality?

Presenters from my GSA group or the local PFLAG come to class and speak on issues surrounding the development of gender identity among GLBTQA youth. I would also ask several humans who identify as female and are in the STEM field to join our discussion. All presenters would specifically be asked to address how being gay/lesbian or even being labeled gay/lesbian has altered other perceptions of what it means to be masculine or feminine. Straight women in STEM will also be asked to discuss how being in a STEM field has altered others perceptions of what it means to be masculine or feminine. The presenters would also speak to participants about the heterosexist bias they often encounter as it relates to STEM careers. Participants would be encouraged to turn in anonymous questions for me to give to the presenters before the presentation and, of course, they are also encouraged to ask questions during the presentation. Participants would have the opportunity to complete an alternative assignment should they have serious objections to attending this discussion.

3) Pose the question: What makes your classroom community a safe place for individuals to express themselves and their gender? Create conversations around times that participants may
have mis-labeled a student. Create plans of how and what to say if you are uncertain of a particular students pronoun.
Activity 1.5 Identifying the Cycle of Socialization as it relates to gender and how it correlates to implicit bias test.

**Audience:**
Humans that identify as female kindergarten teachers

**Materials:**

**Goals:**
Labels are for jars and not humans and how the Cycle of Socialization affects the lens of teachers.

**Background information:**
How humans look at everyday objects and other humans creates a bias unconsciously. No human wants to admit that when they are looking at an object, a person, or even a situation that they are placing judgment. However, the Implicit Bias Test that participants take prior to this activity gives them a data set to interpret bias that the participant may not even know is there. In the book, *Blind Spot*, by social psychologists Banaji and Greenwald, data sets were collected to foster conversation around implicit bias. These data sets from the Implicit Bias Test to draw inferences on how the human brain may work unconsciously, to validate the unconscious thoughts that humans have. As Americans, humans are part of multiple sub groups which are clumped into certain demographics based on social normative behaviors, within one’s culture. Hence, generating a separation of groups such as gender, race, age, and so on. As members of these dominant groups, humans tend to reach out to those that are less privileged than themselves. For example; the *Blind Spot* alludes to the fact that we “handicap ourselves through self-stereotyping”.
Despite educational attempts to eliminate gender stereotyping from society, the propensity to evaluate people on the basis of their sex remains a pernicious social problem. The colour of gender stereotyping (Cunningham, 2011). This social construct can best be explained using the Cycle of Socialization was created by B. Harro (1982). The cycle starts the moment that we are born into the world. For example, in the American culture, girls are expected to identify with the color pink and boys to identify with the color blue.

Lesson Prep: Make photocopies of the following document.

http://www.tolerance.org/sites/default/files/general/role%20plays%203-5.pdf  Activity:

https://www.tolerance.org/classroom-resources/tolerance-lessons/exploring-gender-stereotypes-through-role-plays

Procedure

1. Explain to the class that today you will be doing some role play activities to help them think about gender- and gender-identity-based teasing and bullying.

2. Go over guidelines for acting out a role play. Explain that you will divide participants into groups and give them a scenario to act out. They should act out the situation two times, giving different students the option to play different roles. Then, they should think about how they might solve the problem presented in this scenario.

3. Distribute role plays to different groups of participants. As they rehearse and discuss their scenarios, circulate and help them get through rough patches. Then, come together and have each group share their scenario with the class.

4. After each group presents their role play, discuss the following questions:
   ○ How do you think the different characters in this situation feel?
○ What do you think causes the different characters to do and say the things they do?

○ What are some possible, realistic solutions to this problem?

○ (Note: Remain alert to the fact that children have a tendency to present simple solutions that they think their teachers want to hear. Challenge them to talk about what they might actually do in this situation, including why it might be really hard to come up with a neat solution.)

5. Have participants partner up to reflect on what they learned about gender, from acting out these role plays.

6. Introduce the image of the Cycle of Socialization
According to Adams, Bell, & Griffin (1997), the Cycle of Socialization shows how humans are socialized to act upon certain roles within their own social structure as well as how humans are altered by the system of oppression. It also shows how humans aid in the perpetuation of the oppressive system function upon power of the dominant group. In *Maid in America* by Romero (1992), at the beginning of the cycle you have no control and as humans grow they are bombarded with messages that may be negative or positive. Which then generates internalized patterns that Romero calls boundaries that may limit that particular human’s potential. Unless humans decide to step outside the boundary and advocate for themselves and others, breaking the cycle of socialization will be a challenge.

Throughout the research capsulized with women in engineering and STEM fields, the evidence shows a history of childhood events that lend to the differences in gender. The articles reviewed and analyzed demonstrate a development of stereotypical judgments about which gender are capable of math, science, and engineering with children. The educators within the system, whether intentionally or unintentionally, play a role in sharing a perspective on the evolution of the distinction within gender ‘norms’.

**The effect on teachers.**

According to United States Bureau of Labor, male educators only make up only 2.3% of pre-k and kindergarten teachers (2017). So there is a high probability that the first interaction the majority of kindergarten students in the United States will have is with a female teacher. If female teachers are carrying stereotypes and gender normative behavior ideals that they have been taught over and over again, one could assume that these thoughts may be projected onto
their students. Some kindergarten teachers may not be aware that they are oppressed in the cycle of socialization because to the individual it has been normalized. Some female kindergarten teachers may begin to form negative mindsets about their capability in science, especially physical science, as early as second grade (Mitchell & Webber, 2015). So when teachers walk into a classroom to teach a lesson in STEM, some may live with in the cycle of oppression perpetuating negative stereotypes; may it be conscious or unconscious.

7. Looking back at the reflection questions about gender roles and participants own personal narrative pose the following question: How do you, the participant, feel these factors affect your students in your classroom setting?
Activity 1.6 Interpreting how gender unconsciously determines choice and revisiting baseline

**Audience:**
Humans that identify as female kindergarten teachers

**Materials:**
Scratch paper for reflection questions.

**Goals:**
How gender determines choice in STEM.

**Background information:**

The Wisconsin Department of Education requires pre-K teachers to only have one three credit course in math and in science. This may develop some self-efficacy issues as well as carrying the backpack of oppression for female kindergarten educators because their exposure is very limited. Self-efficacy refers to individuals’ beliefs about their capabilities to carry out a particular course of action successfully (Bandura, 1997). Several studies have been done to address the issue of whether a women’s self-efficacy is an important factor of shaping their decisions about whether to enter STEM education (Tellhed, Backstrom, & Bjorklunds, 2017). Though the concepts are theoretical, the implications are concrete. The messages students gather from years of socialization influence their attitudes about science and math, their self-efficacy beliefs, their choice of coursework, and even their future career plans.

Similar to efficacy, teacher confidence for teaching STEM is an important predictor of ability to teach STEM-related content (Ford, 2007; Jarrett, 1999). Harlen and Holroyd (1997) maintained that low teacher confidence can have a negative influence on student learning. Jarrett
(1999) reported that teacher confidence is influenced by their K–12 educational experiences, teacher preparation curriculum, and informal learning opportunities. Teachers with poor self-worth toward STEM tend to neglect teaching STEM (Appleton, 2003). Since philosophies of the teacher are frequently transferred to their students (Deemer, 2004), poor self-worth toward STEM may be initiated and enhanced by teachers.

A study done by Knight and Cunningham, (2004), which asked students to simply take 5-10 minutes to sketch out on a scratch sheet of paper what an engineer looks like, found “When asked to draw a scientist, both male and female students are more likely to draw men. Of the 64 drawings with evidence of gender, 61% were male characteristics (short hair, square shoulders, necktie), and 39% were female (long hair)” (p. 15). Another study, done shortly after the release of the above information, was completed again, but instead with a group of female kindergarten teachers. The results of this from the teachers were congruent with those of the students asked to draw an engineer (Cunningham & Lachapelle, 2007). In a similar study, pre-K female teachers overwhelmingly demonstrated the same stereotypes as well as misconceptions of what a person in STEM does.

**Lesson Prep:**

A white board or a large sheet of paper

**Activity:** Activity Source:

Content contributed by Teresa Rothausen as a Suggested Work and Family Class Activity for the Sloan Networks’ Resources for Teaching section.

1. Ask participants to list characteristics (traits and behaviors) of the ideal worker in American culture, and write their answers on a flip chart sheet. When finished put the list aside.
2. Write the words "sex" and "gender" on the board. Ask participants to define and explain the difference between these two words.

3. Ask the participants to identify characteristics and behaviors of idealized masculinity (i.e. what type of masculinity is reinforced by our society). Write answers on flip chart sheet.

4. Repeat Step 3, using characteristics and behaviors of idealized femininity.

5. Place lists on the board, on either side of the sex and gender definitions.

6. On the board where you have written the categories of sex and gender, draw a solid line between female and feminine and male and masculine. Ask participants how girls generally learn femininity and how boys learn masculinity.

7. On the board where you have written the categories of sex and gender, draw a dotted line between female and masculine. Ask participants what happens if a female is masculine.

8. Repeat Step 7, by drawing the dotted line between male and feminine.

9. Have students create "ideal wife/mother" and "ideal husband/father" lists on board.

10. Hang the list of "ideal worker characteristics and behaviors" in the space in the middle, over the top of the sex and gender definitions.

11. In small groups, have students discuss the following questions:

12. • What do you notice about the feminine list versus the ideal worker list?

13. • What do you notice about the masculine list versus the ideal worker list?

14. • What do our lists have to do with careers?

15. • What do our lists say about the pay gap between men and women?

16. • What do our lists say about the glass ceiling?

17. Have each group share their answers with the class.

18. In small groups, have students discuss the following questions:
19. • How easy is it for women to get economic power in this gendered system?
20. • How easy is it for mothers to get economic power in this gendered system?
21. • What do our lists have to do with careers?
22. • What about men who want to know and nurture their children or elderly parents?
23. • How does this affect you?…make you feel as a man?…as a woman?

Ask participants why they think the gender differences exist. Have participants reflect upon their findings from the implicit bias test. Have a discussion on how the Cycle of Socialization and their lens on the world may play a role in the thoughts and patterns of their classroom management style?
Activity 1.7 Correlating Female Kindergarten teachers unconscious bias to the STEM pipeline

**Audience:**
Humans that identify as female kindergarten teachers

**Materials:**
Video: Cracking the Code; Quality Education, Equally for all
[https://www.youtube.com/watch?v=3v59jGWK7NQ](https://www.youtube.com/watch?v=3v59jGWK7NQ)

Video: Cracking the Code; Ted talk
[https://www.youtube.com/watch?v=FEeTLopLkEo](https://www.youtube.com/watch?v=FEeTLopLkEo)

**Goals:**
Understand the disproportion in STEM.

**Background information:**

The U.S. Department of Education’s mission is to “promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access”( U.S. Department of Education 2018). The social institution of public education maintains the goal that all students can succeed. In order to do this, educators must create an inclusive environment for all to learn. This thought process and schema is directly related to the number of young women entering the field of STEM (Table 1). When looking at the graph, it is remarkable that the percentage has gone up. In 2006, there were 19.3% females as opposed to 2014 when there were 19.9%. However, the data shows that equality has consistently not been met because it was only .6%.
Bachelor’s Degrees by Gender

![Bar chart showing male and female STEM degrees by gender and year](image)

Table 1. Number of young women who attended public school and went on to STEM degrees as opposed to the number of males. (Yoder, 2015)

Lesson Prep:

Technology: projector, computer with internet access and sound.

Activity:

Using the guiding question write a short 3-5 sentence paragraph:

How do you feel about what you just viewed? What parts of it do you particularly like? Dislike? Why?

After each participant has had time to reflect upon their thought, have them pair up and share their particular thoughts. Then as a large group, allow those that want to share their thoughts to share.
Activity 1.8 Building a box of tools to reflect on equity for personal growth

Audience:
Humans who identify as female kindergarten teachers

Materials:
Paper copies of each mini lesson
Materials list: 1/2" x 10.25" Dowel Rod: One piece, 1" x 6" x 35" Oak or other desired Wood:
One piece, 1 1/4" Wood Screws: 8 pieces, 1/4" Plugs: 6 pieces, Sandpaper, Wood Filler and Glue
and Satin Finish Polyurethane

http://www.woodworkingcorner.com/toolcaddy.php (all pictures below are from the following
website)

Goals:
Creating a toolbox of strategies to promote gender equity in STEM by constructing a tool box
out of wood.

Background information:
Hands-on Learning isn't just for a shop class or a STEM classes. It's the common name for
Experiential Learning, which is the philosophical term behind the idea of immersing oneself in a
subject in order to learn. Experiential Learning has been around since 350 BCE, when Aristotle
wrote, "for the things we have to learn before we can do them, we learn by doing them"
(Aristotle, The Nicomachean Ethics). This idea ultimately became popular in the early 1950's
and thanks to the backing of famous psychologists such as Jean Piaget, Kurt Lewin and John
Dewey. In order to get participants comfortable building and using their hands to learn,
participants will be physically constructing a toolbox in order to learn by doing.
The toolbox metaphorically represents a physical structure in which participants can reflect upon what they have learned throughout the process of the workshop. As participants construct the box, there will be questions associated with each piece of the toolbox to spark a deeper level of thought. The intent is as the participants construct their box they will deconstruct gender normative behavior and action that they may have been doing unconsciously in their classrooms.

**Lesson Prep:**

Have materials and pieces cut

A space to construct box

**Activity:**

Each piece of the box represents a piece of the matrix that creates the unconscious bias in STEM, so as participants are lead through the assembly process there will be a series of reflection questions.

1) 1st piece the base: This piece represents you as the participant! What has been your foundation of thinking and your experiences that have lead you to think a certain way? This is your lens in which you perceive the world. Just like every student in your classroom, the shoes that carry us into the classroom have brought us down different paths. Firstly, participants must understand their lens: What is one event that molded your lens in which you see gender?
On the bottom participants are going to write the words, MY LENS.

2) 2nd piece are the end pieces; these pieces represent the difference between sex and gender. Sex is what we as humans are assigned by a medical doctor at birth. Gender is how we express ourselves in the world and culture in which we as humans exist. How have labels unconsciously shifted your choices as it relates to gender?

3) 3rd pieces are the side pieces; these pieces represent the Cycle of Socialization. This is the social structure that humans are born into in which social norms are born. It is important for educators to understand in order to meet the needs of all students. Educators need to step outside of what they may think is normative behavior to help students social and emotional well being. In return, the student will be able to learn. “Imagine a running race between a cheetah, a leopard, an elephant, a dog and a beetle. All are in good health. The starter’s gun fires and they all take off at exactly the same time. They’ve all got an equal opportunity to win the race, right?
The sides are the entrapment of Cycle of Socialization. As educators, we cannot put students in boxes. As Socrates states: “Education is the kindling of a flame not the filling of a vessel” because we as educators should not tell students how and where to drive their vessel but guide them to their own path.
References

The adult learning theory - andragogy - of malcolm knowles. (2013). Retrieved from


https://search.proquest.com/docview/1891733739


Brainerd, C. *Developmental review* Retrieved from https://www.journals.elsevier.com/developmental-review


Crespi, I. (2018). *Gender socialization within the family: A study on adolescents and their parents in great britain*


STEM perception and preparation: Inquiry-based STEM professional development for
doi:10.1080/00220671.2012.667014

STEM perception and preparation: Inquiry-based STEM professional development for
doi:10.1080/00220671.2012.667014

Pepper, J. (2016, June 20,). John pepper : OVERCOMING IMPLICIT BIAS. Retrieved

Plante, I., Protzko, J., & Aronson, J. (2010b). Girls’ internalization of their female teacher’s
anxiety: A “real-world” stereotype threat effect? Proceedings of the National Academy
of Sciences, 107(20), E79.

*Rewrite the story.* Project, T. R. (Director). (2014, -02-14T14:19:19-05:00).[Video/DVD]
Retrieved from https://vimeo.com/86728310

A quote from the nicomachean ethics. Retrieved from
https://www.goodreads.com/quotes/4184-for-the-things-we-have-to-learn-before-we-can

Recognizing and overcoming false growth mindset. Retrieved from
https://www.edutopia.org/blog/recognizing-overcoming_FALSE-growth-mindset-carol-dweck


Yoder, B. L. Engineering by the numbers.