Workshop Sessions 2017.03.16.1100.Spencer

Notetaker Name: Brandy Wiegers Email/Phone: brandy.wiegers@cwu.edu / 530-220-0324

Speaker's Name:

Joi Spencer (University of San Diego) joi.spencer@SanDiego.edu

http://www.sandiego.edu/soles/academics/med-special-education/biography.php?profile id=2387

Talk Title:

Workshop Session 1a: Building an Equity-Focused Inventory to Understand Mathematics Learning Opportunities in Classrooms and Schools

Date: 03/16/2017 Time: 11:00 - 12:00 am

Materials:

- Presentation slides (pdf)
- Detailed notes from notetaker (pdf)

List 6-12 key words for the talk:

Equity, inventory, mathematics learning, classrooms, Interactive session

Please summarize the lecture in 5 or fewer sentences:

In the context of mathematics education we need to remember that there is a pipeline, so if we aren't doing work in K-12 then we don't have the students to support in math. This presentation asked how we might begin to engage inventory tools designed for our context to help us keep track of and to figure out if we're making progress we need to make in regards to equity. To address this the speaker provided multiple conversation points and provided examples of the California school system. The conclusion of the talk points to the concern that as we move forward as a research community we need to get better, better, and deeper and our tools need to get more powerful to achieve the work we want to achieve.

Building an EquityFocused Inventory
to Understand
Mathematics
Learning
Opportunities in
Classrooms and
Schools

Joi A. Spencer
University of San Diego

Overview

- I. Brief Introductions (Who you are and the work you do)
- II. Critical Issues in Mathematics Education 2017: A Conversation
- III.A Look at California
- IV. Taking Stock: An Inventory Tool

A Conversation

1. Is the system of mathematics education unjust? If so, in what ways is it unjust?

A Conversation

1. Is the system of mathematics education unjust? If so, in what ways is it unjust?

2. Where is the injustice located? (e.g. in instruction, in

society...)

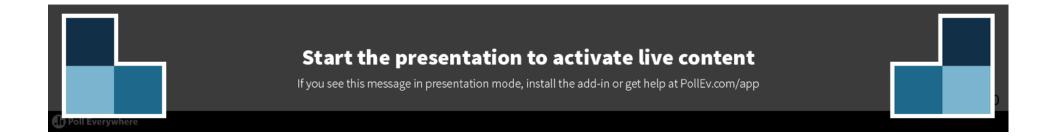
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From your computer/tablet: Respond at pollev.com/joispencer768







A Conversation

- 1. Is the system of mathematics education unjust? If so, in what ways is it unjust?
- 2. Where is the injustice located?

3. Are the injustices observable?

"...we will use **observation** as a tool for understanding and improving imbalances of access, participation, and power in mathematics teaching and learning..."

-Critical Issues in Mathematics Education 2017 Conference Description

OBSERVABLE/TANGIBLE

- Rates of participation
- Types of participation
- Revoicing (who and how)
- Language spoken/allowed to be spoken in the classroom
- Course tracking practices
- Assessment scores

NON OBSERVABLE/INTANGIBLE

- Why students choose to/choose not to participate
- The impact of individual actions on student decisions to engage/not engage
- The development of student identity
- Teacher's decision-making (about who gets which course, who gets called on, etc.)
- Norms

Inequities are both visible and invisible.

California: An Example

Average GPA of entering freshmen at :

- UCLA 4.39 (FALL, 2015)
- UCSD- 4.0-4.27 (FALL, 2016)

Average GPA for Harvard-4.04; Princeton- 3.9

	Public K-12 Student Enrollment (2015)	UC San Diego (2015)
African American	6.0%	2%
American Indian	0.6%	0%
Asian	8.8%	46%
Filipino	2.5%	5%
Hispanic	53.6%	16%
Native Hawaiian	.5%	*
White	24.6%	21%
Multiracial	2.8%	*

Mathematics course-taking as a measure of justice Paul, 2003

Mathematics course-taking as a measure of equity, (Paul, 2003)

Group 1	8th grade Algebra 1
Group 2	9th grade Algebra 1
Group 3	2-year Algebra 1 course
Group 4	1 year & 2 year Algebra 1 course
Group 5	1 year of the 2 year Algebra course

Study examined the experiences of 3,574 HS students from 5 urban high schools.

35% Hispanic 24% White 16% Asian 16% Black 9% Other

Distribution of Students Across Algebra Group by Ethnicity - Paul, 2003

	Asian	Afr. American	Hispanic	White	Other
	510	451	1090	706	252
8th Grade Alg 1	14	3	5	15	12
1 Yr Alg 1	66	62	31	46	60
2 Yr. Alg 1	6	6	18	9	6
1 & 2 Yr.	8	10	20	13	10
1 Yr. of 2	5	18	26	17	13
*p<.01					

Enrollment in Highest Mathematics course by Algebra Group

	8th Alg.	1 Yr. Alg 1	2 Yr. Alg. 1	1 & 2 Yr.	1 of 2 Yr.
	N=274	N=1,442	N= 33	N=417	N= 543
Alg 2 or +	96%	42%	3%	6%	2%
Geometry	4%	27%	14%	23%	3%
Alg. 1		31%	83%	71%	95%

Enrollment in Biology, Chemistry, and Physics by Algebra Group

	8th Alg.	1 Yr. Alg 1	2 Yr. Alg. 1	1 & 2 Yr.	1 of 2 Yr.
	N=274	N=1,442	N= 33	N=417	N= 543
Biology	95%	79%	38%	52%	23%
Chemistry	87%	44%	13%	15%	2%
Physics	44%	12%	2%	1%	0%

With the advent of the Common Core, what are the new "gates" and how can we be diligent against them?

^{*}p<.01

Chemistry Enrollment of students who took 8th grade Algebra 1

Asian	Afr. American	Hispanic	White	Other
95%	83%	79%	85%	90%

With the advent of the Common Core, what are the new "gates" and how can we be diligent against them?

Completion of College Prep Courses w/ Grade of A or B

- Paul, 2003

	Asian	African American	Hispanic	White	Other
8th Grade Algebra 1	14%	0%	9%	20%	10%
1 Yr. Algebra 1	2%	1%	1%	3%	1%

Taking Stock: Understanding Norms

Inequities (in mathematics education) manifest themselves in material ways (we can all see them), but they come about through invisible, normative, and subtle means.

The goal of the last portion of this workshop is for us to think about the invisible, normative, and subtle means through which inequities come about in mathematics education (teaching, learning, structures, etc.) and to work on the development of an inventory that we can use with schools, department chairs, principals, teachers, etc. to help them become conscious of and eventually dismantle these inequities.

Inventories allow us to:

- 1. Define what is important & valued
- 2. Keep track of what is important
- 3. Compare where we think we are to where we actually are
- 4. Make the invisible visible



"A social justice priority in mathematics education is to openly challenge deficit thinking and the institutional tools and practices that perpetuate static views about children and their mathematics competencies."

Building an Equity-Focused Inventory

TEACHER FOCUSED

Where are the critical junctures in my mathematics course? Where are my gates?

- Where do differences in mathematics success and achievement begin to appear?
- Who is successful in my classroom? Who is not?
- Which patterns of success emerge in relation to gender, race, class and/or language background?
- Where are the "Forks in the road"? in my mathematics classroom?

Building an Equity-Focused Inventory

Racism springs not from the hearts of "racists," but from the fact that dominant actors in a racialized social system receive benefits at all levels (political, economic, social, and even psychological), whereas subordinate actors do not.

Bonilla-Silva, Lewis,
& Embrick, 2004. p.
558

SCHOOL, PROGRAM FOCUSED

Where are the critical junctures in our mathematics education **program** for students? Where are our gates?

- Where do differences in mathematics success and achievement begin to appear?
- Who is successful in our mathematics program and who is not?
- Which patterns of success emerge in relation to gender, race, class and/or language background?
- Where are the "Forks in the road" in our mathematics education program?

Building an Equity-Focused Inventory: Pre-Service Teacher Focus

Racism springs not from the hearts of "racists," but from the fact that dominant actors in a racialized social system receive benefits at all levels (political, economic, social, and even psychological), whereas subordinate actors do not. Racial outcomes then are not the product of individual "racists" but of the crystallization of racial domination into a racial structure: a network of racialized practices and relationships that shapes the life chances of various races at all levels.

-Bonilla-Silva, Lewis, & Embrick, 2004. p. 558

The racial population of my high school calculus class was the direct inverse of my schools' population. Everyone who was in the minority in the school was in the majority in this class. Everyone who was in the majority, was in the minority. There were three white kids in my graduating class- two of them were in Calculus. That's 67%. Ten percent of the kids at our school were Asian. Eighty percent of my Calculus class was Asian. My school was 45% Black and 40% Latino. There were two Latino kids in Calculus, and, counting me, three Blacks. It didn't bother me that lots of Asian kids took Calculus. I thought "good for them." What did bother me was that people accepted such illogical proportions as normal. Nobody thought it was strange that out of all of us Black kids, only three had Calculus. (Spencer, 2006, Ch. 2, p. 15)

Thank You

Questions: Joi A. Spencer-joi.spencer@sandiego.edu

Detailed Notes of Workshop Sessions 2017.03.16.1100.Spencer

Building an Equity-Focused Inventory to Understand Mathematics Learning Opportunities in Classrooms and Schools

There is a pipeline, so if we aren't doing work in K-12 then we don't have the students to support in math. How might we begin to engage in inventory, tools designed on our context to help us keep track of and to figure out if we're making progress we need to make in regards to equity. We're going to look at what is going on in California and then look at bigger picture. It's going to be a tool to measure inequity. By not calling it inequitable we don't recognize what it is/ we aren't addressing it in a timely manner.

Brief Introductions: The audience had a range of faculty and teachers who do a range of mathematics, teaching, teacher prep, and other outreach efforts. There are people doing mathematics and mathematics education and from a range of institutions across the country. These attendees are working on college algebra, graduate coursework, outreach in K-12 and much more! There is a lot of good work already going on.

Goal: Have a conversation. We say things are unjust or inequitable, are we saying the say thing? Find a partner that you haven't talked with before and talk with them.

This is a conversation, it can't be wrong or right.

- 1. <u>Is the system of mathematics education unjust? If so, in what ways is it unjust?</u> Several themes arose;
 - Access points/ Assessment:
 - At June Jordan School for Equity (JJSE) they spend a lot of time talking with their students about this and how it is unjust because a lot of students do not have access. A lot of math practices and math material don't have the entry points. At JJSE they have students with a diversity of student experiences and they create connections to their own lives and unique circumstances- deep conceptual and procedural work. Even when they are graduating and working on college level math their being stuck in a lot of remedial courses.
 - (A different teacher) Also, at JJSE they focus on process for students with deep conceptual and procedural work. Students aren't tracked and they are using complex instruction with group worthy tasks daily. We (teachers) know and believe they should be doing that but can't do the breadth of material to make them test ready for 100 level college courses. How do we as a K-16 institution how do we serve all of our students without using one test that is inherently unjust and stops our students?
 - This question is a conversation starter. You might want to think about and there is no answer to. It's very complex phenomenon, different schools are different.
 - Questions we ask don't speak to everyone: Often the way we treat mathematics doesn't relate to students of different backgrounds and doesn't directly show them how to improve their life. We don't prepare them in general to be things beyond engineers. We do not prepare students in general to use mathematics to change to society.
 - Is the system unjust? Yes. Example: If a child goes to school everyday for 180 days and can't add fractions then that's unjust. We broke an agreement with child, broke with parents, and broke with community. Too many kids leaving 5th grade who can't add fractions.
 - Part of problem is **high-stakes testing**: In NY State there is a regents exam system. 15 years ago you had to get 30/87 to pass, student's didn't have to learn ½ the material. Now it's 27/87, we're dumbing down the system. The speaker works with refugees and other underprivileged children.

There is not enough english language learners (ELL) teachers, they are servicing a number of students with interrupted formal education experiences, common core is a reading exam rather than math exam, especially for ELL students who are struggling to get to the math through all the reading to be done.

How much injustice do you need in the system before the system is unjust?
 Individuals want certain types of change to happen - better distribution of our racial and gender categories. When we just look at the tale ends of the distribution (PhDs vs math majors and NBA vs high school basketball teams). There can also be a tension between making sure students are prepared for current reality versus keeping them safe.

Spencer starts with this questions because we're naming it as injustice and we need to know what that this is that we're actually naming as unjust or else we're going in too many directions.

2. Where is the injustice located? (e.g. in instruction, in society) https://pollev.com/joispencer768

Does it happen before you hit my classroom? Is it in narratives?

Spencer's nephew - when he entered high school he came in with high test scores and the only thing he was actively recruited for was the basketball.

If we don't know where the pivot point is then our work becomes diffuse. We need to be more specific and directed in our work, we need to think about what specific injustice we're trying to address.

3. Are the injustices observable?

CIME 2017 was set up with this goal: "we will use observation as a tool for understanding and improving imbalances of access, participation, and power in mathematics teaching and learning..." So are the injustices observable? Have a briefer conversations about ath.

- Somethings are observable in particular the interactions, structures (students-students, students-teachers, students-teachers-curriculum materials). A lot of other things aren't as easy to observe, especially not from video observation (institutional pathways/resources). These may be harder to infer from a bounded snapshot from the classroom, it may be possible to conjecture but will be harder. Observable is interesting phenomenon if one set of things that we're interested in the larger broader picture/societal pictures.
- Effect of injustice is certainly observable (top people in STEM isn't representative of diversity, general success rate of various groups in math tend to vary by race and gender and they shouldn't) but in order to observe in classroom there needs to be studies of driving forces of injustices. Can be observed but need to do more work.
- I'm an elementary principal and I always ask, what would an elementary student say? ... They're going to see that they're not being called in class but they aren't going to be able to say why they haven't been called on in class. Perceived vs observed injustices.

For those of us engaged in the work of researching we need to be careful. What are our tools capable of doing? What are they not capable of doing? Can we build better tools? How do we do that work? It's really important, especially when we're trying to look at something as important as equity/inequity. Look at trying to capture culture but 95% of what happens cultural is invisible. We try to define it all the time with proxy by language, etc. but we don't really get it. We don't really get inequity. We see the result of inequity but we aren't so clear of where it came to be. Let's think about the notion of observable/tangible and non observable/intangible.

OBSERVABLE/TANGIBLE

- Rates of participation who gets called on
- Types of participation when that person gets called on what types of engagement happens?
- Revoicing (who and how)
- Language spoken/allowed to be spoken in the classroom
- Course tracking practices what course you get placed in.
- Assessment scores standardized or classroom specific

NON OBSERVABLE/INTANGIBLE

- Why students choose to/choose not to participate hard to get a handle on
- The impact of individual actions on student decisions to engage/not engage don't know the impact if a student gets slighted. One student will be challenged, another will shut down.
- The development of student identity we have measures of identity but don't have good tools to capture the development.
- Teacher's decision-making (about who gets which course, who gets called on, etc.)
- Norms clear when you're looking back but no one ever came in and states it.

Other observable pieces... Added by group:

- Language teacher uses in classroom to describe mathematics "clearly this is true"
- Curriculum selected does it relate to students' lives? Can reinforce that math isn't a part of who I am because it isn't part of my lived experience.
- Ways of instruction What's happening when you walk into a classroom are there handouts, group work, 100 problems? Get a snapshot of how the school and teacher view the nature and purposes of math.
- When english language learners (ELL) students are tracked based on english language proficiency rather than their mathematical proficiency or take into account the work they've seen prior to entering classrooms.

Spencer: This is a good example. we can get at the label students have but can't see when it impacts the student's' identity.

California: An Example

Average GPA of entering freshmen at :

- UCLA 4.39 (FALL, 2015)
- UCSD- 4.0-4.27 (FALL, 2016)

Average GPA for Harvard-4.04; Princeton- 3.9

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Native Hawaiian	.5%	*
White	24.6%	21%
Multiracial	2.8%	*

California is very inequitable space. We're going to start looking at the data is all of California and then move from there. In many ways we can argue as an undergrad it's harder to get into UCLA vs Harvard/Princeton. For people from California it's a very competitive environment in regards to educational access, some people would say it's inhumane. Look at the distribution for UC San Diego campus looks like compared to public K-12 California.

Mathematics course-taking as a measure of Justice: (Paul, 2003)

5 schools in California: Study examined the experiences of 3,574 HS students from 5 urban high schools. 35% Hispanic 24% White 16% Asian 16% Black 9% Other

5 groups of students:

- Group 1: 8th grade Algebra 1
- Group 2: 9th grade Algebra 1
- Group 3: 2-year Algebra 1 course
- Group 4: 1 year and 2 year Algebra 1 course
- Group 5: 1 year of the 2 year Algebra course

Looking at these break-down based on the percentages of students enrolled from different racial groups

Distribution of Students Across Algebra Group by Ethnicity - Paul, 2003

	Asian	Afr. American	Hispanic	White	Other
	510	451	1090	706	252
8th Grade Alg 1	14	3	5	15	12
1 Yr Alg 1	66	62	31	46	60
2 Yr. Alg 1	6	6	18	9	6
1 & 2 Yr.	8	10	20	13	10
1 Yr. of 2	5	18	26	17	13
*p<.01					

She then looked at the enrollment in highest mathematics course by Algebra group.

So the students that took Algebra in 8th grade, 96% of those students ended high school in Algebra 2 or more. The students that took 1 year of a 2 year algebra course, 95% of those students ended high school having only taken Algebra I.

Enrollment in Highest Mathematics course by Algebra Group								
8th Alg. 1 Yr. Alg 2 Yr. Alg. 1 & 2 Yr. 1 of 2 Yr								
	N=274	N=1,442	N= 33	N=417	N= 543			
Alg 2 or +	96%	42%	3%	6%	2%			
Geometry	Geometry 4% 27% 14% 23% 3%							
Alg. 1		31%	83%	71%	95%			

She then looked at enrollment in biology, chemistry and physics, the three science courses to cover the A-G requirements for UC level acceptance.

So the students that took Algebra in 8th grade, 95% took biology, 87% took chemistry, 44% took physics before these students ended high school.

The students that took 1 year of a 2 year algebra course, 23% took biology, 2% took chemistry, 0% took physics before these students ended high school.

This goes back to the gatekeeping, in some ways the students that took algebra in 9th grade did ok but not quite as well.

Enrollment in Biology, Chemistry, and Physics by Algebra Group								
	8th Alg. 1 Yr. Alg 1 2 Yr. Alg. 1 1 & 2 Yr. 1 of 2 Yr.							
	N=274	N=1,442	N= 33	N=417	N= 543			
Biology	95%	79%	38%	52%	23%			
Chemistry	87%	44%	13%	15%	2%			
Physics	44%	12%	2%	1%	0%			
*p<.01								

Note, this is an older study. With the advent of the Common Core, what are the new "gates" and how can we be diligent against them? We fight for everyone to take algebra in 8th grade, what is the new gates? The data is important.

Chemistry enrollment, a good percentage of those who took 8th grade algebra 1 took chemistry (ranging from 79% - 95% for all racial groups). Paul then looked at completion of college prep course with grade of A or B

What do you notice? From audience:

- Notice that for african american students it didn't make a difference when they took it, for other groups it made it difference.
- Notice that 1 year algebra course doesn't seem to be doing what we think it is doing.

There is a lot more to be said about this but what this showed us that when we do this work we need to keep interrogating what is going on within that. There is a lot of spaces where inequity to substantiate itself. Highly suggest you read Faith Ball's work.

Taking Stock: An Inventory Tool of Inequity

From an upcoming paper of Spencer's: Inequities (in mathematics education) manifest themselves in material ways (we can all see them), but they come about through invisible, normative, and subtle means. We don't know how they come to be.

The goal of the last portion of this workshop is for us to think about the invisible, normative, and subtle means through which inequities come about in mathematics education (teaching, learning, structures, etc.) and to work on the development of an inventory that we can use with schools, department chairs, principals, teachers, etc. to help them become conscious of and eventually dismantle these inequities.

We want to think about the tools we can use to think of tangible and intangible pieces with an inventory.

Inventories allow us to take stock:

- 1. Define what is important and valued
- 2. Keep track of what is important
- 3. Compare where we think we are to where we actually are
- 4. Make the invisible visible.

We can do inventories for many different places: in classrooms, in schools, in our departments, etc.

It's important to call it what it is. Naming it inequity states the importance of action compared to naming it equity.

Building an Equity-Focused Inventory. Teacher focused.

Often teachers can operate with a color-blind norm - everyone is the same. For example in a place like San Diego which is very diverse and the outcomes are very unjust.

They do an inventory with the teachers who are asked to begin to pay attention to specific things. The list is co-created with the teachers. Often these are the items that appear on the list:

- Where are the critical junctures in my mathematics course? Where are my gates?
- Where do differences in mathematics success and achievement begin to appear?
- Who is successful in my classroom? Who is not?
- Which patterns of success emerge in relation to gender, race, class and/or language background?
- Where are the "Forks in the road"? in my mathematics classroom?

So teachers are able to use this inventory and start to noticing new things, for example:

Q: Where do differences in mathematics success and achievement begin to appear?

So if I'm teaching a fifth grade class, over the course of the class I have to think about where these differences happen. When I start having a conversation with teachers about this they have never thought about it before and through this tool they start paying much closer attention to the differences in the classroom.

Q: Who is successful? Teachers decide the focus and develop a tool and pay attention to who is successful based on gender, race, refugee status, language background. Which patterns of success emerge? Where are the forks in the road? Think about 8th grade algebra, are there are other forks? This has engendered some wonderful conversations and great noticing.

Building an Equity-Focused Inventory. School, program focused,

Also get a chance to do work with principals which Spencer is grateful for because we don't often get to engage at this level. Here are some examples of the inventories they've created:

Where are the critical junctures in our mathematics education program for students? Where are our gates?

- Where do differences in mathematics success and achievement begin to appear?
- Who is successful in our mathematics program and who is not?
- Which patterns of success emerge in relation to gender, race, class and/or language background?

• Where are the "Forks in the road" in our mathematics education program?

Principles develop these inventories and also start conversations.

Q: Where do differences in mathematics success and achievement begin to appear? As a principle they're going to look at this differently and they're going to have access to a different set of data to inventory.

Q: Which patterns of success emerge? People don't often look at this, except when they throw together the data report at the end of the year. Principles will now talk about the patterns that they have in their school.

Building an Equity-Focused Inventory: Pre-Service Teachers

How do we also get pre-service teachers to begin to think about and look at these intangibles? Often times with pre service teachers we have them observe classes and Spencer would ask them to look at things like cognitive depth and mathematical discourse.

Now students have to look at these additional questions in their inventory of the classrooms:

- What opportunities do students have to learn mathematic for understanding?
- How was mathematics understanding and success of traditionally marginalized students supported
- What examples of differentiation did you see?
- Who spoke in class today? Who listened? Who succeeded? Who struggled?
- How did the lesson draw on the cultural, social and linguistic experiences of students?
- Were there any aha moments for you as a teacher?

With this inventory these young PreService Teachers now have to be able to speak to that in a way they haven't had to before. You might be surprised about the responses that the PSTs provided most especially as this group of teachers have been taught to not to see color, not to see difference, don't see language.

The goal of this is for us to think about how might we create inventories about our spaces. Not just inventories of things that are easily observable but many of the intangibles. These intangibles are often what is sharing wherever your space might be.

Quote: Racism springs not from the hearts of "racists," but from the fact that dominant actors in a racialized social system receive benefits at all levels (political, economic, social, and even psychological), whereas subordinate actors do not. Racial outcomes then are not the product of individual "racists" but of the crystallization of racial domination into a racial structure: a network of racialized practices and relationships that shapes the life chances of various races at all levels. -Bonilla-Silva, Lewis, & Embrick, 2004. p. 558

Choose this quote to end this. We are arguing and working at many different sites and maybe the site might not be about race. Racism is highly salient in the United States. Whenever we move away from race then we need to check ourselves, this has been the foundation of our development of our country. Many of the thing we are struggling with the fact that we live in a nation that has been built out on this notion that people are white are a whole person and people who are not are a part of a person, they are property. We live in a nation where the economic foundation of the nation was the subjugation of people of color. We have to push ourselves to not move so quickly away from the conversation. We need to stop looking for individual acts of racism. Teachers don't say "I hate all black boys" instead there are the fact that dominant actors in a racialized social system receive benefits at all levels (political, economic, social, and even psychological), whereas subordinate actors do not. We need to stop looking for racists and instead look at actions.

Racial outcomes then are not the product of individual "racists" but of the crystallization of racial domination into a racial structure: a network of racialized practices and relationships that shapes the life chances of various races at all levels.

Hopefully this has been helpful as you work to construct tools and observation tools to do this work. As we move forward as a research community need to get better, better, and deeper and our tools need to get more powerful to achieve the work we want to achieve.

References:

- Paul, 2003
- "I Did Not Get That Job Because of a Black Man...": The Story Lines and Testimonies of ColorBlind Racism Author(s): Eduardo Bonilla-Silva, Amanda Lewis and David G. Embrick. Sociological Forum, Vol. 19, No. 4 (Dec., 2004), pp. 555-581