

From Inclusion to Inqu[ee]ry

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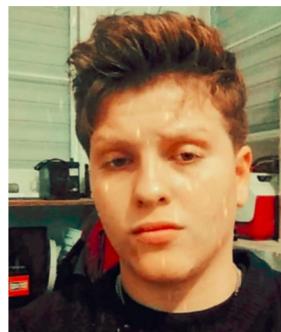


The Queer Mathematics Teacher
Educational Coaching to Re/humanize Mathematics

Honoring the Beautiful Souls We've Lost to Transphobic Violence in 2021



Tyianna
“Davarea”
Alexander



Samuel
Edmund
Damián



Bianca
“Muffin”
Bankz



Dominique
Jackson



Fifty
Bands



Alexus Kimmy
Icon Braxton

References:

Padgett, D. (2021). 6 Trans Americans Have Been Killed in First 6 Weeks of 2021. *Out.com*.
<https://www.out.com/crime/2021/2/03/all-trans-americans-killed-violently-2021#media-gallery-media-1>



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“I come to mathematics carrying all of my humanity. My relationship with it passes through my experience. It affects my view of my world and I bring to it my own perceptions. I can't relate to Bertrand Russell's notion that mathematics is beyond humanity. Without us it is nothing” (Kent, 2019,p. 40).

References:

- Kent, A. (2019). Cold, austere, or queer. Henrich, A. K., Lawrence, E. D., Pons, M. A., & Taylor, D. G. (Eds.). *Living Proof: Stories of Resilience Along the Mathematical Journey* (pp.40-42). American Mathematical Society.



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Positioning Myself In this Work

Florida Born
Middle Class
Monolingual Millennial
White mTBI Survivor
Second-Gen Cuban American
Teacher Educator Latinx
Math Teacher Queer Partner
Learner Woman
First-Gen College Grad
Formerly Catholic
Cisgender
NJ Resident



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LGBTQ+ Terminology - A Crash Course

Breakout Activity #1

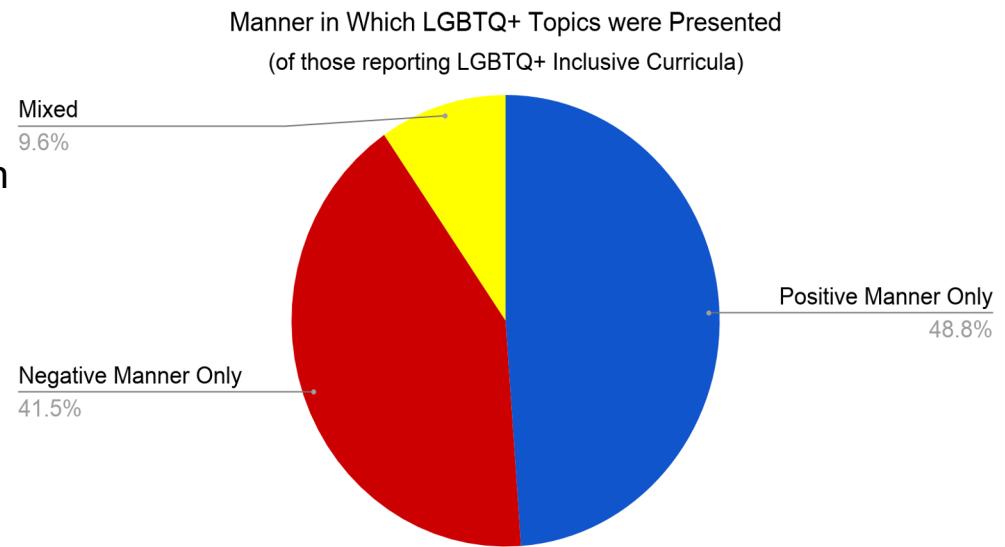
LGBTQ+ Terminology for your “Toolbox”: http://bit.ly/QMT_LGBTQ_Terms

Jamboard: http://bit.ly/NCTM_QueerTerms



Queer Identity in K-12 Schools

- 86.3% of LGBTQ+ students report being harassed or assaulted at school (Kosciw et al., 2020)
- LGBTQ+ students attending schools with LGBTQ+ inclusive curricula have been found to report significantly lower levels of harassment, assault, and bullying at school (Snapp et al., 2015)
- As of the 2019 National School Climate survey, only 33.2% of LGBTQ+ respondents indicated they had been exposed to LGBTQ+ curricula (Kosciw et al., 2020)



References:

- Kosciw, J. G., Clark, C. M., Truong, N. L., & Zongrone, A. D. (2020). *The 2019 National School Climate Survey: The experiences of lesbian, gay, bisexual, transgender, and queer youth in our nation's schools*. GLSEN.
- Snapp, S. D., McGuire, J. K., Sinclair, K. O., Gabrion, K., & Russell, S. T. (2015). LGBTQ-inclusive curricula: Why supportive curricula matter. *Sex Education*, 15(6), 580-596.

Queer Representation in K-12 Math

- Students are *least likely* to report seeing positive representations of LGBTQ+ topics in math (only 3.6% of those with inclusive curricula reported such representation in math) (Kosciw et al., 2020).
- Many math problems are still presented with the assumption of a gender binary or heterosexual pairings (Esmonde, 2011; Rubel, 2016; Yeh, 2017)

References:

- Esmonde, I. (2011). "Snips and Snails and Puppy Dogs' Tails: Genderism and Mathematics Education." *For the Learning of Mathematics* 31, no. 2 (June): 27–31.
- Kosciw, J. G., Clark, C. M., Truong, N. L., & Zongrone, A. D. (2020). *The 2019 National School Climate Survey: The experiences of lesbian, gay, bisexual, transgender, and queer youth in our nation's schools*. GLSEN.
- Rubel, L. H. (2016). Speaking up and speaking out about gender in mathematics. *The mathematics teacher*, 109(6), 434-439.
- Yeh, C. (2017). "Sex, Lies, and Word Problems." Math Tasks to Talk About (blog), Teaching Children Mathematics. <https://www.nctm.org/Publications/Teaching-Children-Mathematics/Blog/Sex,-Lies,-and-Word-Problems/>.



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But Does it *Really* Matter in Math?

YES

- In undergraduate studies, fewer LGBTQ+ students pursue STEM majors than non-LGBT students (Greathouse et al., 2018)
 - Fewer LGB students go on to persist in their STEM majors than non-LGB students (Hughes, 2018)
- LGBTQ+ students are less likely to complete Algebra II than non-LGBTQ+ students, which “is particularly relevant given... algebraic understanding is gateway material to both college and a successful career” (Whipple, 2018).
- At least one study has indicated that supportive LGBTQ+ school environments relates to “stronger mathematical identity” (Fischer, 2013, p. vii)
 - This is consistent with my own experience as a queer individual.

References:

- Fischer, D.J. (2013). Out 4 math: The intersection of queer identity and mathematical identity.
- Greathouse, M., Brckalorenz, A., Hoban, M., Huesman, R., Rankin, S., & Stolzenberg, E. B. (2018). Queer-spectrum and trans-spectrum student experiences in American higher education: The analyses of national survey findings.
- Hughes, B. E. (2018). Coming out in STEM: Factors affecting retention of sexual minority STEM students. *Science advances*, 4(3), eaao6373.
- Whipple, K. (2018). LGBTQ secondary mathematics educators: Their identities and their classrooms.



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What Can We Do?

LGBTQ+ Inclusive
Curriculum

Mathematical
Inqu[ee]ry

LGBTQ+ Inclusive Math Curriculum

LGBTQ+ inclusive math curriculum refers to math curricular materials that provide LGBTQ+ representation, avoiding the presentations of solely heterosexual pairings, male/female binary of gender, normative gender roles, and so on. Rands (2009) calls this *add-queers-and-stir*

Examples:

- Illuminations LP Symmetry & Identity: An Exploration of the “Progress” Flag [[Handouts](#)] (coming soon!)
- Harper’s (2020) What’s a Fair Living Wage? [Activity](#) and [Task Cards](#)
- Using GLSEN’s [National Climate Survey](#) and/or [infographics](#) for a lesson on statistical concepts or other mathematical concepts (such as [matrices](#)).

References:

- Harper, F. (2020) Lesson 6.6: What’s a fair living wage? In Berry III, R. Q., Conway IV, B. M., Lawler, B. R., & Staley, J. W. (Eds.), *High school mathematics lessons to explore, understand, and respond to social injustice* (pp. 148 - 152). Corwin Press.
- Meyer, B. & Staley, J.W. (2020) Lesson 5.3: Listen to GLSEN. In Berry III, R. Q., Conway IV, B. M., Lawler, B. R., & Staley, J. W. (Eds.), *High school mathematics lessons to explore, understand, and respond to social injustice* (pp. 89 - 98). Corwin Press.
- Kosciw, J. G., Clark, C. M., Truong, N. L., & Zongrone, A. D. (2020). *The 2019 National School Climate Survey: The experiences of lesbian, gay, bisexual, transgender, and queer youth in our nation's schools*. GLSEN.
- Rands, K. (2009). Mathematical inquiry: Beyond ‘add-queers-and-stir’ elementary mathematics education. *Sex Education*, 9(2), 181-191.
- Waid, B.E. (forthcoming 2021). *Symmetry and identity: An exploration of the “progress” flag*. NCTM Illuminations website.



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Mathematical Inqu[ee]ry

Mathematical Inqu[ee]ry is about “questioning the tasks, the strategies, the very ways of thinking and doing mathematics as well as the way mathematics is used to interpret and act in the world” (Rands, 2009, p.186).

Making Connections:

Gutstein's (2006) *pedagogy of questioning* -
“students have opportunities to pose their own
real, meaningful questions about issues of
sociopolitical importance, fairness, and equality”
(p. 132) and use mathematics to explore those
questions.

So is this just another method of
teaching math for social justice but
with queer stuff too?

References:

- Gutstein, E. (2006). *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. Taylor & Francis
Rands, K. (2009). Mathematical inqu [ee] ry: Beyond ‘add-queers-and-stir’elementary mathematics education. *Sex Education*, 9(2), 181-191.



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Social justice and Gutstein’s pedagogy of questioning

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Mathematical Inqu[ee]ry

Questioning of ALL knowledge, not just power and privilege

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Making Connections:

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Social justice and Gutstein’s pedagogy of questioning

So is this just another method of teaching math for social justice but with queer stuff too?

NOT EXACTLY



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References:

- Gutstein, E. (2006). *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. Taylor & Francis
Rands, K. (2009). Mathematical inqu [ee] ry: Beyond ‘add-queers-and-stir’ elementary mathematics education. *Sex Education*, 9(2), 181-191.

Mathematical Inqu[ee]ry

My interpretation:

Inqu[ee]ry is about fostering a *questioning stance* within students, so they may learn to engage critically with everything they encounter, questioning norms not only in the classroom but also in their everyday lives.

You Retweeted

Matt Coaty
@Mcoaty

Question: What is a better buy: a dozen eggs for \$2.16 or 18 eggs for \$2.90?

Student response: I noticed that it did not mention anything about the way the chickens were treated, and if you do not know that, you cannot know which one to buy.

Kids are amazing.

6:59 PM · Feb 11, 2021 · Twitter Web App

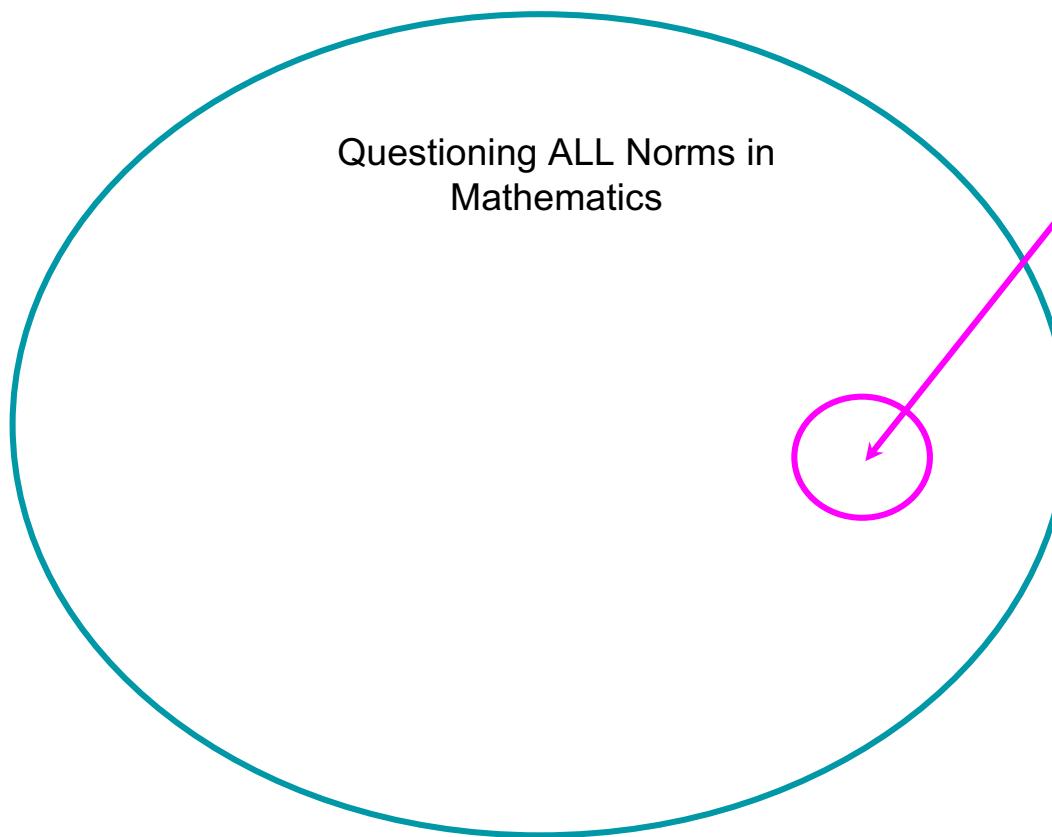
References:

Coaty, M. [@mcoaty]. (2021, February 11). Question: What is a better buy: A dozen eggs for \$2.16 or 18 eggs for \$2.90? Student response: I noticed [Tweet]. Twitter.
<https://twitter.com/Mcoaty/status/1360015680427462656>



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Mathematical Inqu[ee]ry



Questioning
Heteronormativity
in Mathematics /
Using Mathematics
to Challenge
Heteronormativity

One Model of LGBTQ+ Centered Inqu[ee]ry: CDQs for Gender and Sexuality

1. What do you notice?
2. What do you wonder?
3. What is the context?
4. What genders are represented, and how are they presented?
5. Who is included in the represented genders and who is not?
6. What other genders are there?
7. What would considering other genders identities (not just male and female) add to our understanding? (p. 83, Waid and Turner, 2021)

References:

- Asdourian, T., Cohen, A., Cukier, M., Doyle, A., Foygel, R., Howell, T., Tabrisky, B., & Thakker, A. 2006. *Park School Mathematics Curriculum Book 1: Reasoning and Proving*. Park School of Baltimore Mathematics Department.
- New York State Education Department. 2015a. *EngageNY Grade 3 Mathematics Module 1*. Eureka Math.
- New York State Education Department. 2015b. *EngageNY Grade 5 Mathematics Module 4*. Eureka Math.
- Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.

Non-social justice examples:

- There are 83 girls and 76 boys in the 3rd grade. How many total students are in the 3rd grade? (NYSED, 2015a, p.20)
- There are 48 students going on a field trip. One-fourth are girls. How many boys are going on the trip? (NYSED, 2015b, p.109)
- At a school dance, there are X boys and Z girls, and there are more boys than girls. How many different possible couples for dancing are there? (Asdourian et al., 2006, p.15).



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One Model of LGBTQ+ Centered Inqu[ee]ry: CDQs for Gender and Sexuality

1. What do you notice?
2. What do you wonder?
3. What is the context?
4. What genders are they presenting?
5. Who is included? Genders and who else?
6. What other gender identities (not just binary) are represented?
7. What would consider our understandings? (Turner, 2021)

Non-socialization examples:

Benefits of using CDQs in this way:

- Pushes students to recognize boundaries/borders/norms and look beyond them
- Allows students to pose mathematical questions (just like mathematicians!)
- Moves away from inauthentic problems
 - No more buying 100 watermelons at the supermarket!

...are there? (Asdourian et al., 2006, p.15).

boys in the 3rd grade
students are in the 3rd grade (p.20)
many boys are going on a field trip.
many boys are going to the beach (p.5b, p.109)
there are X boys and Z girls. How many more boys than girls. How many couples for dancing (p.15).
are there? (Asdourian et al., 2006, p.15).

References:

- Asdourian, T., Cohen, A., Cukier, M., Doyle, A., Foygel, R., Howell, T., Tabrisky, B., & Thakker, A. 2006. *Park School Mathematics Curriculum Book 1: Reasoning and Proving*. Park School of Baltimore Mathematics Department.
- New York State Education Department. 2015a. *EngageNY Grade 3 Mathematics Module 1*. Eureka Math.
- New York State Education Department. 2015b. *EngageNY Grade 5 Mathematics Module 4*. Eureka Math.
- Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.



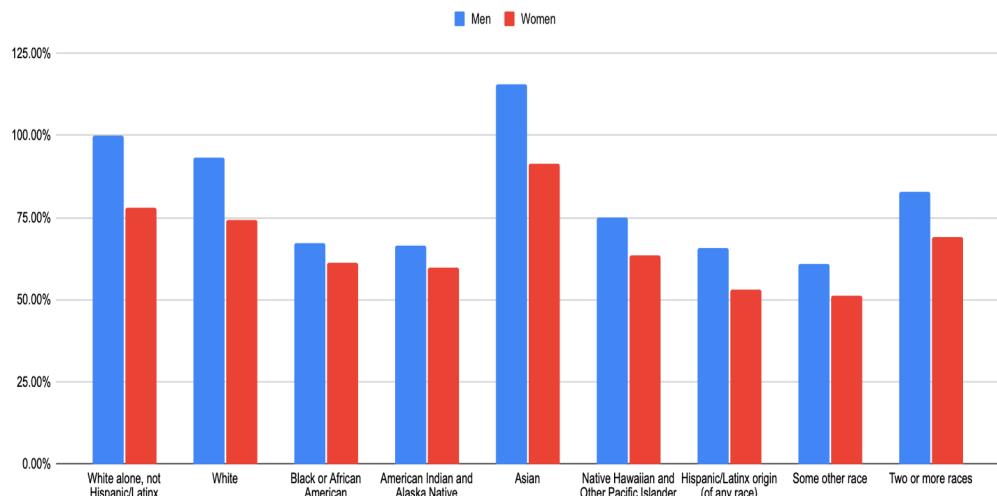
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CDQs Social Justice Secondary Example

1. What do you notice?
 2. What do you wonder?
 3. What is the context?
 4. What genders are represented, and how are they presented?
 5. Who is included in the represented genders and who is not?
 6. What other genders are there?
 7. What would considering other genders identities (not just male and female) add to our understanding?
- (Waid and Turner, 2021, p.83)

Social justice example (Middle or High School):

2019 Annual Median Income as Compared to White Men's (non-Hispanic/Latinx)



Data Source: US Census Bureau

References:

- US Census Bureau. (2018). "Median earnings in the past 12 months (in 2018 inflation-adjusted dollars) of workers by sex and women's earnings as a percentage of men's earnings by selected characteristics." Census.gov.
<https://data.census.gov/cedsci/table?q=&g=&lastDisplayedRow=24&table=S2002&tid=ACSST1Y2014.S2002&vintage=2014&t=Income%20%28Households,%20Families,%20Individuals%29>.
- Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.



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CDQs Social Justice Secondary Example: CDQ 3 Adaptations

CDQ 3:

What is the context?

(Waid and Turner, 2021, p.83)

1. What does the x-axis represent? The y-axis?
2. What's the difference between white and white (non Hispanic/Latinx)? Why is there no categories for Black (non Hispanic/Latinx), Black Latinx or white Latinx?
3. For every dollar made by a white man (non Hispanic/Latinx), how much does an Asian man make? A Black woman? A Native American woman?
4. Overall, what can we say about the income of men vs women? Of people across races/ethnicities?
5. For every dollar made by
 - a. a white woman (non Hispanic/Latinx), how much does a Black woman make? A Black man?
 - b. an Asian man, how much does a Native American man make? A Latinx woman?
 - c. a Black man, how much does a woman of two or more races make? A woman of some other race?

References:

Waid, B.E. (under review) A Mathematical inqu[ee]ry into the pay gap. *Journal of Mathematics Education at Teachers College.* [questions in green box]

Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.



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CDQs Social Justice Secondary Example: CDQ 3 Adaptations (Continued)

CDQ 3:

What is the context?

(Waid and Turner,
2021, p.83)

1. Where did this data come from?
2. How is US Census Bureau data collected? Are there other ways this data could have been collected?
3. Who is included in this data and who is not? Would this be considered a representative sample?
4. Are percentages the only way to understand this topic?
5. Does this data represent sex or gender? What's the difference?
6. Why does the Census Bureau report asking about respondents sex? Why do they state such information is helpful?
7. Could similar reasoning be used to justify changing the question from asking about sex to asking about gender? Why or why not?

References:

Waid, B.E. (under review) A Mathematical inqu[ee]ry into the pay gap. *Journal of Mathematics Education at Teachers College*. [questions in red box]

Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.



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CDQs Social Justice Secondary Example: CDQs 4-6 Adaptation

CDQs 4-6:

What genders are represented, and how are they presented?

Who is included in the represented genders and who is not?

What other genders are there?

(Waid and Turner, 2021, p.83)

If the authors of the American Community Survey were to instead ask for gender, but the available options remained limited to male and female, who would the data set include (i.e. which genders?) and who would not?

References:

Waid, B.E. (under review) A Mathematical inqu[ee]ry into the pay gap. *Journal of Mathematics Education at Teachers College*. [questions in blue box]

Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.



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CDQs Social Justice Secondary Example: CDQ 7 Adaptations

CDQs 7:

What would considering other genders identities (not just male and female) add to our understanding?

(Waid and Turner, 2021, p.83)



- What would considering other gender identities (not just male and female) add to our understanding of pay inequality?
- Is there data available on the income of people that identify outside the male/female binary? Is there data available on the income of transgender people?

References:

- Waid, B.E. (under review) A Mathematical inqu[ee]ry into the pay gap. *Journal of Mathematics Education at Teachers College*. [questions in yellow box]
- Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.



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CDQs Social Justice Secondary Example: Rinse and Repeat

1. What do you notice?
2. What do you wonder?
3. What is the context?
4. What genders are represented, and how are they presented?
5. Who is included in the represented genders and who is not?
6. What other genders are there?
7. What would considering other genders identities (not just male and female) add to our understanding?
(Waid and Turner, 2021, p.83)

Findings from Schilt and Wiswall's (2008) study of transgender men and women's income before and after transition:

- Transgender women's income falls approximately 32 percent after they transition.
- Transgender men's income increases approximately 1.5 percent after they transition.

Note: Not all transgender people transition and those that do transition in various ways and to various degrees. Each transgender person's experience is unique.

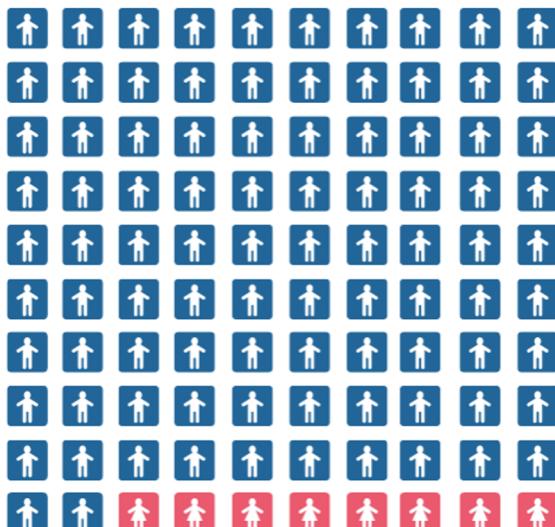


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CDQs Social Justice Elementary Example

1. What do you notice?
2. What do you wonder?
3. What is the context?
4. What genders are represented, and how are they presented?
5. Who is included in the represented genders and who is not?
6. What other genders are there?
7. What would considering other genders identities (not just male and female) add to our understanding? (Waid and Turner, 2021, p.83)

Gender of Leading TV Characters in STEM Roles in US (2019-2020)



Data Source: *Closing the STEM Gender Gap* by Geena Davis Institute on Gender in Media.

References:

Geena Davis Institute on Gender in Media. (2021). "Closing the Stem Gender Gap" seejane.org. <https://seejane.org/wp-content/uploads/closing-the-stem-gender-gap-uk-report.pdf>

Waid, B.E. and Turner, K.H. (2021). Inqu [ee] ry across the curriculum.. *English Journal*, 110(3), 82-88.



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Breakout Activity #2

What are some ways in which you could engage students in inqu[ee]ry in your math classes?

http://bit.ly/NCTM_inqueerybrainstorm



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Resources

Check out the new “Resources” tab on my website!

<https://www.TheQueerMathematicsTeacher.com/resources/>



Questions?

Have Feedback?

Visit http://bit.ly/NCTM_QMTFeedback



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Thank you!

Stay Connected!

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