

CULTURALLY RESPONSIVE TEACHING  
IN AN ALGEBRA I CLASS  
FOR REPEATING 9TH GRADERS

By Jenny Van Buren, Ed.D.  
Powdersville High School  
Anderson School District One  
South Carolina

---

---

---

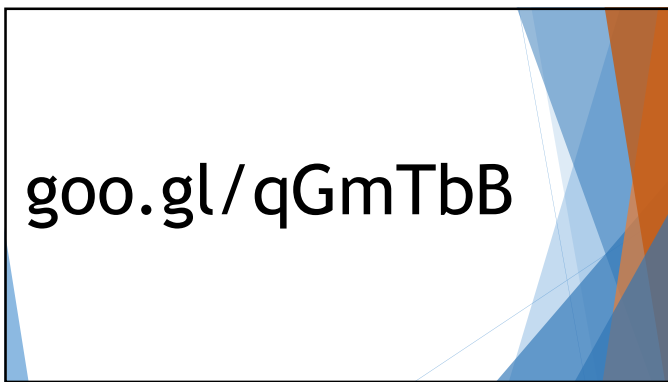
---

---

---

---

---



goo.gl/qGmTbB

---

---

---

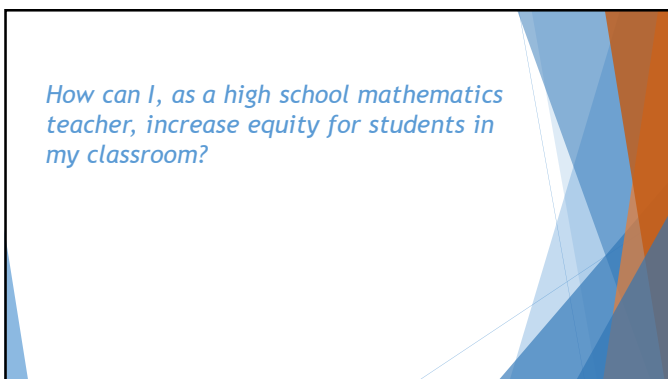
---

---

---

---

---



*How can I, as a high school mathematics teacher, increase equity for students in my classroom?*

---

---

---

---

---

---

---

---

### Why is it important to work to increase equity in education?

- ▶ Reduce poverty, imprisonment, and unemployment rates
- ▶ Increase the number of suitable candidates for employment, particularly in mathematics and science related fields
- ▶ Increase diversity in the workforce, particularly in professions related to mathematics and science

---

---

---

---

---

---

---

### Research Question

*What does it mean to be a culturally responsive teacher in the context of an Algebra I class for repeating ninth graders?*

---

---

---

---

---

---

---

### Sub-Questions

1. *What are relationships between students and myself as well as among students like?*
2. *How are high expectations for academics and behavior communicated and enacted in my Algebra 1 class?*
3. *How do students engage in learning activities in my Algebra 1 class, and how might student engagement be negotiated depending on their individual backgrounds and prior experiences?*

---

---

---

---

---

---

---

### Challenges when working with diverse groups of students who have previously been unsuccessful in mathematics courses

- ▶ Curricular Tracking
- ▶ Student Diversity and Disproportionate Representation
- ▶ Teacher Beliefs, Biases and Prejudices
- ▶ Lack of Interest in Learning Mathematics among Students

---

---

---

---

---

---

---

---

### Culturally Responsive Classroom Practices

- ▶ Relationship Building
- ▶ High Expectations
- ▶ Engaging Lessons

---

---

---

---

---

---

---

---

### Examples of How Culturally Responsive Teachers Focus on Relationship Building

- ▶ Communicating with students
- ▶ Working on relationships *among* students
- ▶ Intervening when classroom inequities occur
- ▶ Personally extending invitations for parents to become involved
- ▶ Engaging in critical reflection of their own values, assumptions, and biases

---

---

---

---

---

---

---

---

### Examples of How Culturally Responsive Teachers Demonstrate High Expectations

- ▶ Ensuring that students hear, understand, and practice routines, providing both examples and non-examples
- ▶ Modeling metacognitive activities
- ▶ NOT permitting students to choose failure
- ▶ Using both verbal and non-verbal communication
- ▶ Engaging in deep reflection, data collection and analysis
- ▶ Considering alternative explanations for behaviors
- ▶ Monitoring their own assumptions
- ▶ Taking action to improve outcomes when expectations are not met

---

---

---

---

---

---

---

---

### Examples of How Culturally Responsive Teachers Plan and Implement Engaging Lessons

- ▶ Incorporating high interest, engaging activities
- ▶ Planning sequences of activities that ensure students have positive first encounters with content
- ▶ Attending to student learning styles
- ▶ Presenting content in a variety of formats
- ▶ Assisting students in constructing knowledge socially, through discourse, activity, and interaction related to meaningful problems

---

---

---

---

---

---

---

---

### Context of this Study

- ▶ Algebra 1 inclusion class for repeating ninth graders
- ▶ TL Hanna High School in Anderson, South Carolina
- ▶ 2016-2017 school year

---

---

---

---

---

---

---

---

### Participants in this Study

- ▶ 12 students (5 female/7 male)
- ▶ Demographics

---

---

---

---

---

---

---

### Research Methods

- ▶ Practitioner (Teacher Action) Research
- ▶ Unit 10, Exponential Functions
- ▶ Spring 2017 semester
- ▶ Approximately 3 weeks

---

---

---

---

---

---

---

### Data Collection and Analysis

- ▶ Data included:
  1. Student Interviews (unstructured and semi-structured)
  2. A Researcher Journal
  3. Observation/Field Notes
  4. Lesson Videos
  5. Student Work Samples
- ▶ Both Formative and Summative Data Analysis

---

---

---

---

---

---

---

### Summative Data Analysis Process

- ▶ Re-reading transcripts
- ▶ Re-reading my researcher journal
- ▶ Reviewing the video data multiple times
- ▶ Grouping data with similar codes to develop possible themes

---

---

---

---

---

---

---

---

### What are relationships between students and myself as well as among students like?

Code/Theme	Examples of Evidence from Data
Increasing my understanding of students' backgrounds and learning styles	<ul style="list-style-type: none"> <li>• Two way communication between myself and students about their home lives, community, and funds of knowledge</li> <li>• My own reflection and modification of lessons based on observing students</li> </ul>
Trust of me as the teacher	<ul style="list-style-type: none"> <li>• Students asking for teacher help</li> <li>• Student talk about areas of weakness/problems</li> <li>• Students taking risks (or not)</li> </ul>
Student resistance to working with particular students	<ul style="list-style-type: none"> <li>• Resistance to randomly assigned groups</li> </ul>
Trust among students and student risk taking in mathematics	<ul style="list-style-type: none"> <li>• Students asking for peer help/support (or not)</li> <li>• Talk about areas of weakness/problems among peers</li> <li>• Students sharing answers confidently (or not), even when there is a risk of being incorrect</li> </ul>

---

---

---

---

---

---

---

---

### How are high expectations for academics and behavior communicated and enacted in my Algebra 1 class?

Code/Theme	Examples of Evidence from Data
Communicating expectations to think deeply about mathematical concepts and to explain reasoning	<ul style="list-style-type: none"> <li>• Students writing down the formula that they selected to use, showed what numbers were substituted into the formula, and showed steps that were used to simplify the expression</li> <li>• Students effectively communicating their reasoning when solving problems</li> <li>• Students making connections that they saw to prior learning</li> </ul>
Communicating behavior expectations	<ul style="list-style-type: none"> <li>• Behavior expectations provided in multiple formats</li> <li>• Students self-directing behaviors and transitioning smoothly between tasks</li> </ul>
Following through with consequences for inappropriate behaviors	<ul style="list-style-type: none"> <li>• Me following through with consequences for misbehavior</li> </ul>

---

---

---

---

---

---

---

---

How do students engage in learning activities in my Algebra 1 class, and how might student engagement be negotiated depending on their individual backgrounds and prior experiences?

Code/Theme	Examples of Evidence from Data
Engagement in Collaborative Group Work	<ul style="list-style-type: none"> <li>• Collaboration, movement, hands on learning</li> <li>• Students writing, talking about math, using the materials appropriately, and solving problems</li> </ul>
Disengagement in Collaborative Group Work	<ul style="list-style-type: none"> <li>• Students working independently and talking about non-math topics during group work</li> <li>• Students not working together to solve problems together</li> </ul>
Engagement in Teacher-Led Discussions, Notetaking, and Independent Practice	<ul style="list-style-type: none"> <li>• On-task behaviors such as students writing in their notebooks, verbally responding questions, and watching me as I modeled activities</li> </ul>
Disengagement in Teacher-Led Discussions, Notetaking, and Independent Practice	<ul style="list-style-type: none"> <li>• Off task behaviors</li> <li>• Me reminding students to either get started or to stop disturbing their classmates</li> </ul>

---

---

---

---

---

---

---

---

## Relationships and Communication

- ▶ Student trust of teacher
- ▶ Peer relationships among students
- ▶ The productive struggle in learning mathematics and communicating about thinking

---

---

---

---

---

---

---

---

## Student Engagement

In general, students did not engage with mathematics in open and authentic manners. This manifested in ways that they did not:

- 1) Discuss mathematical ideas with their peers
- 2) Share mathematical ideas in whole-group discussions, nor
- 3) Write down their own ideas until the correct answer was confirmed.

---

---

---

---

---

---

---

---

### How could I impact student engagement?

- ▶ Focusing on the instructional design of the lesson
- ▶ Increasing the appeal of the activity to students' individual learning styles and needs
- ▶ Adjusting how I facilitated the lesson
- ▶ Always working on relationships and the classroom culture

---

---

---

---

---

---

---

### Moving Forward

- ▶ Continuing to identify my own possible negative perceptions and working to change them
- ▶ Carefully constructing and modifying lessons to match the unique learning styles and preferences of the students that I am currently teaching
- ▶ Doing a *better* job of advocating for changes to benefit all students and promoting the idea that all students are capable of learning and achieving at high levels
- ▶ Continuing to improve upon my classroom culture and build relationships

---

---

---

---

---

---

---

### Conclusion

- ▶ This study confirmed what literature suggests as challenges teachers face when working with diverse groups of students who have previously been unsuccessful in mathematics courses.
- ▶ This study suggested that my students may have held negative perceptions about their own academic identities and abilities, the abilities of their peers, or their peers' and teachers' beliefs about them, but that teachers have the potential to overcome these challenges by becoming more culturally responsive in their instructional practices.
- ▶ For the 12 students that participated in this study, the mean score on the Algebra 1 EOCEP was 60.75%. 66.7% (8 of the 12) passed the exam. 83% of the students that participated in this study (10 of the 12) earned credit for Algebra 1.

---

---

---

---

---

---

---



**What does it mean to be a culturally responsive teacher in the context of an Algebra I class for repeating ninth graders?**

## References

- Anderson School District 5. (2016). *Algebra I A/B - Curriculum Pacing Guide - 2016-2017*. Anderson, SC: Author.
- Blanchett, W. J., Klingner, J. K., & Harry, B. (2009). The intersection of race, culture, language, and disability: Implications for urban education. *Urban Education*, 44(4), 389-409. doi: 10.1177/0042085909338686
- Bondy, E., Ross, D. D., Galligane, C., & Hambacher, E. (2007). Creating environments of success and resilience: Culturally responsive classroom management and more. *Urban Education*, 42(4), 336-348. doi: 10.1177/0042085907303409
- Bondy, E., & Ross, D. (2008). The teacher as warm demander. *Educational Leadership*, 66(1), 54-58.
- Bonner, E. (2014). Investigating practices of highly successful mathematics teachers of traditionally underserved students. *Educational Studies in Mathematics*, 88(3), 377-399. doi: 10.1007/s10649-014-9533-7
- Books, S. (Ed.). (2007). *Invisible children in the society and its schools* (3rd ed.). Mahway, NJ: Lawrence Erlbaum Associates, Publishers.
- Buckley, L. A. (2010). Unfulfilled hopes in education for equity: Redesigning the mathematics curriculum in a US high school. *Journal of Curriculum Studies*, 42(1), 51-78.
- Cochran-Smith, M., & Lytle, S. L. (2009). *Inquiry as stance: Practitioner research for the next generation*. New York: Teachers College Press.
- Creswell, J. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage Publication.
- Dana, N. F., & Yendol-Hoppey, D. (2014). *The reflective educator's guide to classroom research: Learning to teach and teaching to learn through practitioner inquiry* (3rd ed.). Thousand Oaks, CA: Corwin.
- Darling-Hammond, L. (2010). *The flat world and education: How America's commitment to equity will determine our future*. New York: Teacher's College Press.
- Diemer, M. A., Marchand, A. D., McKellar, S. E., & Malanchuk, D. (2016). Promotive and corrosive factors in African American students' math beliefs and achievement. *Journal of Youth and Adolescence*, 45(6), 1208-1223. doi: 10.1007/s10964-016-0439-9
- Dray, B., & Wisneski, D. (2011). Mindful reflection as a process for developing culturally responsive practices. *Teaching Exceptional Children*, 44(1), 28-36.

- Drop and Catch. (n.d.). Retrieved from <https://nctm.confex.com/nctm/2016AM/webprogram/Handout/Session40193/LinearVSExponentialNCTM-brqcandy.pdf>
- Fredricks, J. A., Blumenfeld, B. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of educational research*, 74(1), 59-109.
- Gay, G. (2002). Preparing for culturally responsive teaching. *Journal of Teacher Education*, 53(2), 106-116.
- Gay, G. (2010). *Culturally responsive teaching: Theory, research, and practice*. New York: Teachers College Press.
- Gorski, P. (2013). *Reaching and teaching students in poverty*. New York: Teachers College Press.
- Hill, C. (2010). When traditional won't do: Experiences from a "lower-level" mathematics classroom. *The Clearing House*, 83(6), 239-243. doi: 10.1080/0099865.2010.484439
- Horn, L. S. (2012). *Strength in numbers: Collaborative learning in secondary mathematics*. Nashville, TN: National Council of Teachers of Mathematics.
- Kose, B. W., & Lim, E. (2011). Transformative professional learning within schools: Relationship to teachers' beliefs, expertise and teaching. *The Urban Review*, 43(2), 190-216.
- Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465-491.
- NBA lab (Exponential growth and decay). (n.d.). Retrieved from [http://jbyrniczka.weebly.com/uploads/4/0/9/1/4091095/nmactivity\\_10.pdf](http://jbyrniczka.weebly.com/uploads/4/0/9/1/4091095/nmactivity_10.pdf)
- McGraw Hill. (2010). *Algebra I interactive student guide for the common core*. Glencoe: McGraw Hill.
- Milner, H. R., & Howard, T. C. (2015). *Rac(e)ing to class: Confronting poverty and race in schools and classrooms*. Cambridge: Harvard Education Press.
- Morrison, K. A., Robbins, H. H., & Rose, D. G. (2008). Operationalizing culturally relevant pedagogy: A synthesis of classroom-based research. *Equity & Excellence in Education*, 41(4), 433-452. doi: 10.1080/10665680802400006
- National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: The National Council of Teachers of Mathematics, Inc.
- Nieto, S. (2013). *Finding joy in teaching students of diverse backgrounds: Culturally responsive and socially just practices in US classrooms*. Portsmouth, NH: Heinemann.

Ross, D., & Adams, A. (2010). *Secrets of successful teaching: Lessons from award winning teachers*. Gainesville, FL: Lastinger Center Clearinghouse.

Rice, D., & Alfred, M. (2014). Personal and structural elements of support for African American female engineers. *Journal of STEM Education: Innovations and Research*, 15(2), 40-49.

Ross, D., Bondy, E., Galligan, C., & Hambacher, E. (2008). Promoting academic engagement through insistence. *Childhood Education*, 84(3), 142-146.

Rury, J. L. (2013). *Education and social change: Contours in the history of American schooling* (4th ed.). New York, NY: Routledge.

Schlitter, J.T. (2008) "These are our children!" an examination of relationship-building practices in urban high schools. *Urban Review*, 41, 461-485.

South Carolina Department of Education. (2016). *South Carolina State Report Card*. Retrieved from <http://ed.sc.gov/data/report-cards/state-report-cards/2015/district/709-0405>

South Carolina Public Schools. (2016). *Quick Facts Education in South Carolina*. Retrieved from <http://ed.sc.gov/data/other/>

Stein, M. K., & Smith, M. S. (1998). Mathematical tasks as a framework for reflection: From research to practice. In K.E. Easterday, F. M. Simpson, & T. Smith. (Eds.). *Activities for junior high school and middle school mathematics* (Vol. 2). Reston, VA: National Council of Teachers of Mathematics.

The Teacher Toolkit. (n.d.). Frayer model. Retrieved from <http://www.theteachertoolkit.com/index.php/tool/frayer-model>

Ullucci, K., & Howard, T. (2015). Pathologizing the poor: Implications for preparing teachers to work in high-poverty schools. *Urban Education*, 50(2), 170-193. doi: 10.1177/0043005914543117

Weinstein, C., Tomlinson-Clarke, S., & Curran, M. (2004). Toward a conception of culturally responsive classroom management. *Journal of Teacher Education*, 55(1), 25-38.

U.S. Department of Education. (2015). *Teaching strategies for improving algebra knowledge in middle and high school students* (NCEE 2015-4010). Retrieved from [https://ies.ed.gov/ncee/ner/Docs/PracticeGuide/teach\\_algebra\\_040715.pdf](https://ies.ed.gov/ncee/ner/Docs/PracticeGuide/teach_algebra_040715.pdf)

York-Barr, J., Sommers, W. A., Ghere, G. S., & Montie, J. (2006). *Reflective practice to improve schools: An action guide for educators* (2nd ed.). Thousand Oaks, CA: Corwin.

---

---

---

---

---

---

---

---

---

---