

# **Editor's Perspective Article: Supporting Students from Underrepresented Groups in Mathematics for Alternative Certification Teachers**

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## *Abstract*

*It is important for new teachers in alternative certification programs to ensure all of their students receive quality education, particularly in mathematics education. Mathematics is a gatekeeper subject in which strong quantitative skills lead to increased opportunities. This article addressed support new alternative certification teachers need as well as the support they could provide to students in diverse mathematics classrooms. Alternative certification teachers in the New York City Teaching Fellows (NYCTF) program were surveyed, among others, to determine their attitude toward student learning in diverse classroom environments in mathematics education. It was found that while NYCTF teachers did not score differently from traditionally prepared teachers on the survey instrument, NYCTF scored higher than another cohort of teachers. NYCTF teachers indicated highest agreement with the idea that students from underrepresented groups are just as capable of engaging in higher level mathematics as White and Asian male students and teachers should take student interests into consideration when teaching mathematics.*

*Key words: alternative certification; mathematics; underrepresented students*

The views expressed in this article are the editor's views and do not necessarily reflect the views of the National Association for Alternative Certification.

A challenge for new teachers enrolled in alternative certification programs is to ensure that *all* of their students are receiving a high-quality education, particularly in mathematics education. As teachers enter classrooms in less affluent urban schools with majority African American and Latina/o students, it is imperative teachers be fully prepared to teach these students with high-quality instruction. Stinson and Wager (2012) said that teaching in mathematics should be “rooted, in part, in the belief that all children should have access to rich, rigorous mathematics that offers opportunities and self-empowerment for them to understand and use mathematics in their world” (p. 10). On one level there are important variables for teacher quality, such as content knowledge, teacher attitudes and beliefs, and teacher efficacy. All of these variables are necessary, but not sufficient, for quality teachers to possess. On another level there are important variables necessary for quality teaching including social justice orientations, cultural responsiveness, connecting the mathematics to lives of the students, and fostering an atmosphere of trust and care in the classroom (Haberman, 1991; Ladson-Billings, 1994; Leonard, Napp, & Adeleke, 2009; Martin, 2007).

Social justice orientation is the teacher’s commitment to equal rights and equity for all regardless of race, ethnicity, gender, or sexual orientation. However, more importantly for the classroom, it is the teacher’s commitment to a high-quality education for all students with an emphasis on increasing the opportunities for those from traditionally underrepresented groups. Additionally, social justice orientation requires valuing diversity and opposing discrimination in all forms (Garii & Rule, 2009). Leonard and Evans (2012) defined social justice pedagogy as

holding specific social-justice-related perspectives and actions that provide all students with opportunities to learn rigorous mathematics in culturally specific meaningful ways that seek to improve the economic and social conditions of marginalized individuals and groups, and that work toward the reduction (if not the complete elimination) of deficit-oriented beliefs and dispositions about who is or is not “good” at mathematics (p. 100).

As seen in Leonard and Evans’s (2012) definition of social justice pedagogy in mathematics, culturally responsive pedagogy is implicit in a social justice orientation. Social justice commitment requires teachers to teach from a culturally responsive perspective, which is a viewpoint that considers the students’ backgrounds in the preparation and delivery of meaningful, engaging, and effective lessons in consideration of the students’ needs (Gay, 2000; Ladson-Billings, 1994; Leonard, 2008). This model is in opposition to the “color-blind” approach to teaching, which ignores student differences as well as the historical, cultural, and educational experiences that shape the lives of students from traditionally underrepresented groups.

A critical component for teaching from a social justice and culturally responsive perspective is teachers must tailor their lessons toward the lives of their students. Strong content knowledge is critical and it is important that every student has a teacher with high content knowledge. Ball, Hill, and Bass (2005) claimed the size of the effect of teachers’ mathematical knowledge was comparable to the effect of socioeconomic status. However, while Martin (2007) said that content knowledge is an essential condition for

effective teaching, teachers who are unable to connect the content to the lives of their students will be ineffective even if these teachers possess strong content knowledge. Teaching from a culturally responsive perspective takes the individual students into consideration in order to facilitate connections between the content and the students' lives.

In order for students to be successful, particularly students from traditionally underrepresented groups, they must feel their teachers truly care about their lives and education. Gay (2000) and Ladson-Billings (1994) said it is critical students feel they can trust their teachers and the teachers care about the students. Students who have been conditioned to distrust teachers, and who feel teachers do not keep their best interests in consideration, will expect these attitudes and behaviors from their teachers (Haberman, 1991). This is particularly critical for teachers from alternative certification programs given their prevalence in high-need schools.

Mathematics has been called a “gatekeeper” subject because of its importance for success in college and career (D’Ambrosio, 2012; Gau Bartell, 2012; Gonzales, 2012; Koestler, 2012; Leonard, 2008; Martin, 2002; Moses & Cobb, 2001; Stinson, 2004). Gonzales (2012) said that “knowledge of mathematics is often a prerequisite for full and successful participation in society” (p. 128). This is particularly relevant for students from traditionally underrepresented groups (Gonzales, 2009; Thomson & Hillman, 2010), which requires focus on improving mathematics student learning by teachers whose commitment to social justice frames their teaching philosophies. In order for teachers to help develop strong mathematical content knowledge in students from diverse classrooms, they need to teach mathematics from social justice orientations, cultural responsiveness, connections of mathematics to students' lives, and the fostering of trust and care in the classroom.

### **Alternative Certification Teachers in New York**

Alternative certification teacher preparation programs have been increasingly filling the need for teachers throughout New York. The largest alternative certification program in New York is the New York City Teaching Fellows (NYCTF) program (Kane, Rockoff, & Staiger, 2006), which grew very quickly since the inception of the program in 2000. Boyd, Lankford, Loeb, Rockoff, and Wyckoff (2007) said, “Fellows grew from about 1 percent of newly hired teachers in 2000 to 33 percent of all new teachers in 2005” (p. 10). There are over 8,000 NYCTF teachers in New York, which represents about 11 percent of all New York teachers (NYCTF, 2012a).

The NYCTF teachers enter the program in June and immediately begin graduate coursework in a master's degree program while being immersed in fieldwork. In September NYCTF teachers become the teachers of record in their own classes while they continue their graduate studies in education over the next several years. Teachers receive a provisional Transitional B teaching license in New York and are eligible to apply for initial certification upon successful completion of their program and state certification examinations.

The majority of students in New York schools are non-White. For example, in 2010 Black students accounted for 44 percent of all New York students, which was the largest demographic group, while White students accounted for only 14 percent of New York students (New York State Education Department, 2011). Additionally, since NYCTF teachers generally teach in less affluent New York schools (NYCTF, 2012a), it is important that NYCTF teachers be able to address the needs of students of color and students from lower socioeconomic backgrounds. While it is certainly true that White teachers can successfully implement culturally responsive methods into their classrooms (Leonard, 2008), it is also an important goal to diversify the profession. It is notable that the teachers in the NYCTF program come from diverse backgrounds. A key demographic for the NYCTF program is the teachers are approximately 40 percent non-White (NYCTF, 2012b).

### **Teacher Retention in the New York City Teaching Fellows Program**

Teacher retention is important for teacher quality and student achievement, particularly for students in low income communities (National Commission on Teaching and America's Future, 2003). Additionally, the cost to states and tax payers for teacher attrition can be quite high (National Commission on Teaching and America's Future, 2003), which means less funding becomes available to the schools. Teacher retention rates are high for NYCTF teachers with the NYCTF program reporting "92 percent completing their first year of teaching, 75 percent teaching at least three years, and over half teaching at least five years" (NYCTF, 2012a). NYCTF said this is in contrast to traditionally prepared teacher retention rates of 84 percent after the first year, 67 percent after three years, and 46 percent after five years (National Commission on Teaching and America's Future, 2003). The National Commission on Teaching and America's Future (2003) also reported "the turnover rate for teachers in high poverty schools is almost a third higher than the rate for teachers in all schools" (p. 10). Considering NYCTF teachers generally teach in less affluent New York schools (NYCTF, 2012a), perhaps the comparison should be made with high poverty school retention rates, and not general rates.

Other findings seem to confirm the high retention rate experienced by NYCTF teachers. Sipe and D'Angelo (2006) found about 70 percent of NYCTF teachers intended to stay in education. Additionally, Kane et al. (2006) found that Teaching Fellows and traditionally prepared teachers had similar retention rates. However, Boyd, Grossman, Lankford, Loeb, Michelli, and Wyckoff (2006) found about 46 percent of Teaching Fellows stayed in teaching after four years compared to 55 to 63 percent for traditionally prepared teachers.

While it is important to retain quality teachers in schools populated by low income students and students of color, it is important that the teachers of these students have the right dispositions toward teaching students from diverse backgrounds from traditionally underrepresented groups. If teacher educators understand the attitudes new alternative certification teachers have toward teaching students from underrepresented groups, they can better support their new teachers in shaping their attitudes.

### Attitudes toward Teaching Underrepresented Groups

Teachers in mathematics methods for elementary school teachers in the alternative certification NYCTF program were surveyed to determine their attitudes toward teaching mathematics to underrepresented groups. For comparison, two other groups of teachers were surveyed: traditional master's degree program preservice teachers and Teacher Education Assessment and Management (TEAM) program preservice teachers. The TEAM program collaborated with the partnering university and it is an organization that facilitates various partnerships with universities on behalf of student members who then receive tuition discount (TEAM, 2012). Cohorts consist of 12 to 20 Orthodox Jewish teachers enrolled in the program to prepare for certification to teach in Yeshiva and Hebrew academies.

The mathematics methods course was taught with emphasis on social justice and teaching mathematics from a problem solving perspective. The total sample consisted of 52 NYCTF teachers, 14 traditional preservice teachers, and 12 TEAM teachers. The imbalance in sample sizes was due to availability. The survey instrument used was the Attitudes toward Teaching Underrepresented Groups in Mathematics (ATUGM) instrument and consisted of 11 items using a 5-point Likert scale.

A one-way ANOVA was conducted to determine if there were overall differences between the three groups (see Table 1 for means and standard deviations), and a statistically significant difference was found at the .01 level with  $F(2, 75) = 6.705$ ,  $p = .002$ ,  $\eta^2 = 0.152$ . A post hoc test (Tukey HSD) determined exactly where the means differed among the groups. NYCTF teachers scored significantly higher than TEAM teachers with  $p = .002$ .

Table 1

#### *Overall Means and Standard Deviations for All Teachers*

Group	Sample Size	Mean	SD
NYCTF	52	4.61	0.405
Traditional	14	4.47	0.276
TEAM	12	4.16	0.430
Total	78	4.52	0.418

Means and standard deviations for each item are presented in Tables 2 and 3 for all teachers and NYCTF teachers, respectively.

Table 2

#### *Survey Results on ATUGM for All Teachers*

Items	Mean	SD
1. A social justice orientation for teachers is just as important as strong teacher content knowledge and pedagogical skills in a mathematics classroom.	4.27	0.893
2. Being responsive to student culture and background is just as important as strong teacher content knowledge and pedagogical skills in a mathematics	4.46	0.733

classroom.		
3. Connecting mathematics to the lives of the students is just as important as strong teacher content knowledge and pedagogical skills in a mathematics classroom.	4.59	0.633
4. Fostering classroom trust and an atmosphere of care is just as important as strong teacher content knowledge and pedagogical skills in a mathematics classroom.	4.72	0.601
5. Students from underrepresented groups in mathematics (e.g., African American, Latina/o) are just as capable of engaging in higher level mathematics as are White and Asian male students.	4.77	0.556
6. It is important for teachers to differentiate their teaching in order to reach students from underrepresented groups.	4.50	0.769
7. Mathematics is a subject in which <i>all</i> students can succeed.	4.53	0.751
8. It is important to expose students to people from diverse backgrounds in mathematics-based careers.	4.49	0.734
9. Teachers should model problems in mathematics using characters from diverse backgrounds (e.g., using ethnic names in word problems).	4.27	0.832
10. Classroom books should have pictures of people from diverse backgrounds (e.g., textbooks).	4.41	0.829
11. Teachers should take student interests into consideration when teaching mathematics.	4.67	0.677

*Note.*  $N = 78$

Table 3  
*Survey Results on ATUGM for NYCTF Teachers*

Items	Mean	SD
1. A social justice orientation for teachers is just as important as strong teacher content knowledge and pedagogical skills in a mathematics classroom.	4.21	0.977
2. Being responsive to student culture and background is just as important as strong teacher content knowledge and pedagogical skills in a mathematics classroom.	4.48	0.779
3. Connecting mathematics to the lives of the students is just as important as strong teacher content knowledge and pedagogical skills in a mathematics classroom.	4.62	0.631
4. Fostering classroom trust and an atmosphere of care is just as important as strong teacher content knowledge and pedagogical skills in a mathematics	4.73	0.598



classroom.		
5. Students from underrepresented groups in mathematics (e.g., African American, Latina/o) are just as capable of engaging in higher level mathematics as are White and Asian male students.	4.88	0.323
6. It is important for teachers to differentiate their teaching in order to reach students from underrepresented groups.	4.51	0.828
7. Mathematics is a subject in which <i>all</i> students can succeed.	4.73	0.630
8. It is important to expose students to people from diverse backgrounds in mathematics-based careers.	4.70	0.506
9. Teachers should model problems in mathematics using characters from diverse backgrounds (e.g., using ethnic names in word problems).	4.44	0.752
10. Classroom books should have pictures of people from diverse backgrounds (e.g., textbooks).	4.60	0.748
11. Teachers should take student interests into consideration when teaching mathematics.	4.83	0.430

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*Note. N = 52*

### Conclusion

While no difference was found between NYCTF teachers and traditionally prepared teachers, a difference was found between NYCTF teachers and TEAM teachers. Given the social justice perspective emphasized by the NYCTF program, it is possible that NYCTF teachers are attracted to the program due to this viewpoint as well as the opportunity to quickly begin teaching in high-need urban schools. NYCTF generally teach in diverse schools in New York. TEAM prepares teachers to teach in more homogenous Yeshiva and Hebrew academies, and therefore TEAM teachers may have less exposure to diverse groups of students.

NYCTF teachers indicated highest agreement with the idea that students from underrepresented groups are just as capable of engaging in higher level mathematics as White and Asian male students and teachers should take student interests into consideration when teaching mathematics. NYCTF teachers indicated lowest agreement with the idea that a social justice orientation for teachers is just as important as strong teacher content knowledge and pedagogical skills in a mathematics classroom and teachers should model problems in mathematics using characters from diverse backgrounds. NYCTF appeared to be more committed to student equality in regard to ability and success, but they were less committed to the idea of social justice orientations being as important as content and pedagogical knowledge.

Earlier it was said that Martin (2007) regarded content knowledge as an essential condition for effective teaching. However, teachers who are unable to connect the content to their lives of their students will be ineffective even if these teachers possess strong

content knowledge. NYCTF highly agreed on the importance of connecting mathematics to their students' lives.

It has been shown that teachers are more likely to embrace a social justice perspective if all or most of their courses in their teacher preparation program consistently emphasize social justice (Koestler, 2012; Nieto, 2000). It is therefore imperative that teachers be engaged in social justice pedagogy and taught how to incorporate social justice into their lessons in order to best prepare teachers to teach urban students from diverse backgrounds. In the next issue a follow up editor's perspective article will be presented regarding supporting female students in mathematics for alternative certification teachers.



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