FIRST YEAR MIDDLE AND HIGH SCHOOL TEACHERS' MATHEMATICAL CONTENT PROFICIENCY AND ATTITUDES: ALTERNATIVE CERTIFICATION IN THE TEACH FOR AMERICA (TFA) PROGRAM

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The purpose of this study is to understand the mathematical content proficiency middle and high school teachers have before and after their first year teaching and taking graduate coursework in the Teach for America (TFA) program, as well as what attitudes toward mathematics TFA teachers have over the first year. There was a significant increase in both mathematical content proficiency and positive attitudes toward mathematics over the TFA teachers' first year teaching. TFA teachers generally believed the emphasis on social justice was of biggest benefit to them and that classroom management was the biggest problem faced in their teaching.

Key words: Alternative certification, Teach for America, mathematics content proficiency, attitudes toward mathematics

Mathematical content proficiency and attitudes have become increasingly important issues in mathematics education (Amato, 2004; Ball, Hill, & Bass, 2005). This study looks at one cohort of mathematics Teach for America (TFA) middle and high school teachers in terms of their mathematical content proficiency in their first year of teaching and taking graduate education coursework, as well at their attitudes toward mathematics and teaching over the course of that year. The purpose of this study is to understand what mathematical content proficiency exists both before and after the first year for TFA teachers, as well as what attitudes TFA teachers hold. Further, the purpose is to determine what differences in content proficiency and attitudes exist between middle and high school TFA teachers as well as among the different undergraduate majors the teachers had. Teacher content proficiency is important since content knowledge is a necessary, but not sufficient, condition for good teaching (Ball, Hill, & Bass, 2005). Attitudes toward mathematics are important since there is a reciprocal relationship between achievement in mathematics and attitudes toward mathematics (Evans, 2007; Ma & Kishor, 1997). Further, negative teacher attitudes toward mathematics often lead to avoidance of teaching the content as well as affect their students' attitudes and behaviors (Amato, 2004; Leonard & Evans, 2007). Moreover, there has been little published on the effects of field

experience on new mathematics teacher content proficiency and attitudes (Philipp et al., 2007; Leonard & Evans, under review). Philipp et al. found that preservice teachers with field experience at the elementary level showed an increase in content proficiency and beliefs as compared to those who did not have field experience. This study intends to expand upon the literature regarding the field experience relationship, specifically in-service teaching, with content proficiency and attitudes in new teachers.

The sample used in this study was a TFA first year cohort. Teach for America's mission is to "build the movement to eliminate educational inequity by enlisting our nation's most promising future leaders in the effort" (TFA, 2008a). Their vision "is that one day, all children in this nation will have the opportunity to attain an excellent education" (TFA, 2008a). TFA is a non-profit organization formed in 1990 with the intention of sending college graduates to low-income schools to make a difference for the underserved students. Its founder, Wendy Kopp, was herself a new graduate of Princeton University looking to do something more with her life after graduation (Kopp, 2003). She considered that many recent college graduates at America's top universities would consider teaching low-income students if given the opportunity. The idea was that there should be a teachers' corps that would allow new graduates at top universities with an interest in teaching to quickly begin teaching students in underserved communities. Kopp considered that her idea could be a Peace Corps for the 1990's, and that the teachers would either stay in education or go into other sectors and remain advocates for public education. Thus the framework for what would become TFA was developed. Recent college graduates would commit to teaching for two years while taking coursework in teacher education, and they would serve in low-income schools throughout the United States.

There has been a recent interest in studying the effects of TFA teachers in America's classrooms (Darling-Hammond, 1994, 1997; Darling-Hammond, Holtzman, Gatlin, & Heilig, 2005; Laczko-Kerr & Berliner, 2002; Xu, Hannaway, & Taylor, 2008). Both Darling-Hammond et al. and Laczko-Kerr and Berliner studied the effects of TFA teachers in elementary school classrooms. Xu et al. claim to have produced the first study examining the effects of TFA teachers at the secondary level.

Laczko-Kerr and Berliner (2002) studied the effects on student achievement by TFA teachers in Arizona. They found that the students of TFA teachers did not perform significantly differently from students of other uncertified teachers. However, "the level of performance of students of the TFA teachers was lower than that of the students taught by equally inexperienced but fully certified teachers" (Laczko & Berliner, 2002). The authors also found that the students of certified teachers performed better than the students of uncertified teachers. The authors concluded that the situation in Arizona is not very different from the national situation. However, caution should be taken due to the often mentioned low state spending per student in Arizona. According to the U.S.

Census Bureau (2003), only Utah spent less money per student than Arizona at the time of this study.

Darling-Hammond, Holtzman, Gatlin, and Heilig (2005) conducted research comparing certified and uncertified teachers in Houston, Texas in the mid 1990's to early 2000's. Like Laczko-Kerr and Berliner (2002), the authors found that certified teachers consistently produced significantly higher student achievement gains as compared to uncertified teachers. They found this to include TFA teachers as well. That is, certified teachers in general produced significantly higher student achievement gains as compared to uncertified TFA teachers. Certified TFA teachers, after two to three years of a teacher preparation program, performed just as well as general certified teachers in the field. However, Darling-Hammond, Holtzman, Gatlin, and Heilig caution that, upon becoming certified, many TFA teachers leave teaching. This is in contrast to Teach for America's own report of retention of TFA teachers on their website. TFA claims that about two-thirds of TFA teachers stay in the field of education upon completing their time in the program, and half of those remain in teaching. That means that, of all TFA alumni, about one-third stay in the classroom upon fulfilling their commitment, according to TFA. Further, Tai, Liu, and Fan (2006) claim that alternative certification teachers, in general, have comparable commitment to the teaching profession as do traditionally trained teachers. Caution should be taken that this takes alternative certification of mathematics and science teachers in general into account and not simply TFA.

Darling-Hammond, Holtzman, Gatlin, and Heilig (2005), referencing the findings by Raymond, Fletcher, and Luque (2001) and Decker, Mayer, and Glazerman (2004), said they found that the students of TFA teachers have comparable gains in achievement, or better, than other similarly experienced teachers. However, Darling-Hammond, Holtzman, Gatlin, and Heilig say that the comparison group of teachers was disproportionately untrained and uncertified. Darling-Hammond, Holtzman, Gatlin, and Heilig found mixed results for the effectiveness of TFA teachers on student achievement in mathematics and found certified TFA teachers to be more effective than other teachers with standard certification for student achievement on one standardized mathematics test, but marginally less effective than other teachers with standard certification on a different standardized mathematics test. Finally, it should be noted that the authors admit that, even though uncertified TFA teachers in the classroom are not as effective as certified teachers, TFA teachers fill a gap and provide stability for several years in underserved schools where students might otherwise receive a long line of substitute teachers.

Xu, Hannaway, and Taylor (2008) claim to have conducted the first study of TFA teachers at the secondary level. Thus, there is a need for more research on secondary level TFA teachers. Xu, Hannaway, and Taylor were particularly interested in mathematics and science, and focused on TFA teachers in North Carolina. Contrary to some other reports on TFA teachers, Xu, Hannaway, and Taylor found TFA teachers to be more effective, as measured by student

achievement, than traditional teachers, including more experienced traditional teachers. TFA teachers were able to offset their lack of experience perhaps through better academic preparation or motivation. Xu, Hannaway, and Taylor caution that placement of TFA teachers in the most high needs schools and classrooms needs to be considered when comparing TFA to more traditionally prepared teachers in general, and the authors account for this placement in their research methodology. They cite two studies conducted in New York City that report on the effectiveness of TFA teachers (Boyd, et al., 2006; Kane, Rockoff, & Staiger, 2006). Both studies claimed that TFA teachers had significantly higher student achievement in mathematics when compared to certified teachers from grades 4 to 8. Boyd et al. found specifically an advantage in TFA teachers in the middle school years. Xu, Hannaway, and Taylor conclude that, despite finding TFA teachers to be more effective, perhaps with more pedagogical training TFA teachers could become even more effective teachers.

According to TFA (2008b), the Teach for America 2007 National Principal Survey found that, overall, more than 90 percent of the 785 principals surveyed reported that (a) they were satisfied with TFA teachers, (b) TFA teachers have made a positive impact in their schools, and (c) they would hire TFA teachers again. Again, more than 90 percent of principals rated TFA teachers as effective as or more effective than other beginning teachers. Finally, more than 90 percent of principals rated TFA teachers as effective as the overall teaching faculty with half rating TFA teachers more effective than the overall teaching faculty. Similarly, principals rated TFA teacher training at least as good as the training of other beginning teachers. Of particular interest to this current study was that principals said that, generally, TFA teachers are knowledgeable in their subject matter.

From the literature, it is clear that research has been conducted on TFA teacher effectiveness in regards to student achievement with conflicting results. No known studies specifically focus on the mathematics content proficiency and attitudes toward mathematics for TFA teachers. This current study attempts to fill that gap, as well as provide additional, much needed research on secondary and middle school TFA teachers. This study will make a contribution to the field by addressing a much needed focus on secondary TFA teachers and on TFA teachers' mathematical proficiency and attitudes, two areas much neglected in the literature.

Research Questions

1. What differences exist between first year TFA teachers' mathematical content proficiency in the beginning and at the end of their first year teaching and taking teacher education courses in a graduate program?
2. What differences exist between first year TFA teachers' attitudes toward mathematics in the beginning and at the end of their first year teaching and taking teacher education courses in a graduate program?

3. Is there a difference in mathematical content proficiency between middle and high school first year TFA teachers?
4. Is there a difference in attitudes toward mathematics between middle and high school first year TFA teachers?
5. Is there a difference in mathematical content proficiency between different undergraduate majors for first year TFA teachers?
6. Is there a difference in attitudes toward mathematics between different undergraduate majors for first year TFA teachers?
7. What are first year TFA teachers' attitudes toward mathematics, teaching, and learning?

Methodology

The methodology of this study is a mixed methodology that involves both quantitative and qualitative methods. The sample in this study consisted of 22 first year TFA teachers who were in both their first year of teaching mathematics and their first year taking teacher education coursework in a graduate program at a large university in the northeastern United States. The teachers in this study were selected due to availability and thus represent a convenience sample. Approximately half of the teachers were female and half were male. The age range of the TFA teachers was from early to mid 20's. Prior to teaching in September, TFA teachers took summer coursework to help prepare for their first year. They continued their coursework over the following two years while teaching. The format for the integrated coursework is that classes are taken once per month on a Saturday with online work submitted and discussions held online during the week. Thus, TFA teachers met with their instructor eight times during the year for approximately six hours of class time on the Saturdays. This enabled the TFA teachers to better manage their time during the week and allowed them to focus on their teaching and schools. However, teachers who chose to earn a Master's degree, as opposed to just certification, in this process must attend some evening classes during the week in their second year in addition to more summer coursework. This does not apply to teachers who only wish to be certified without a Master's degree. First year mathematics TFA teachers essentially take three courses over the course of the year in the combined Saturday program: Mathematics Methods, Assessment, and Literacy.

TFA teachers were given a mathematical content test and an attitudinal questionnaire at the beginning and the end of their first year. The mathematics content test consisted of 25 items ranging from algebra to calculus. The mathematics content test taken at the end of the year was similar in form and content to the one taken at the beginning of the year. The attitudinal questionnaire was adapted from Tapia (1996) and had 39 items that measured attitudes toward mathematics including self-confidence, value, enjoyment, and motivation in mathematics. The instrument used a 5-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). Finally, students were required to keep

reflective journals on their learning and teaching throughout the second half of the year.

The quantitative data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 15.0. The primarily statistical analyses utilize paired samples and independent samples *t*-tests and one-way ANOVA. The Constant-Comparative Method (Glaser & Strauss, 1968) was used to analyze the teacher journals.

Research question one is answered using data collected from the mathematics content test. A paired samples *t* test was used to determine if any significant increase occurred over the course of the first year teaching. The results of the data analysis from the attitudinal instrument are used to answer research question two. A paired samples *t* test is used to determine any significant attitudinal differences over the first year. The third and fourth research questions use independent samples *t* tests using data collected from the mathematics content test and attitudinal test, respectively. One-way ANOVA was used to analyze the fourth and fifth research questions.

Research question seven was answered using both quantitative and qualitative methodology. The quantitative method was an independent samples *t* test, and the qualitative method was the Constant-Comparative Method on teacher journals. TFA teachers were required to keep journals for both learning and teaching aspects in their first year. Learning journals were used so that teachers could reflect on their own learning in the teacher education coursework over the first year, and teaching journals were used so that teachers could reflect on their own teaching.

Results

To determine internal reliability of the attitudinal instrument, a Cronbach alpha coefficient was found to be 0.93 on the pretest and 0.92 on the posttest. Caution should be taken in interpreting this value since the number of participants was only 22. These values are consistent with the literature (Tapia, 1996).

The first research question was answered using a paired samples *t* test. The results of the paired samples *t* test (two-tailed) reveal a statistically significant difference between pretest scores ($M = 79.05$, $SD = 14.679$) and posttest scores ($M = 82.91$, $SD = 16.550$) for the mathematics content test with $t(21) = -2.350$, $p = 0.000$, $d = 0.25$. This means there was a statistically significant increase in content proficiency as measured by the mathematics content test over the course of the semester. However, the effect size is relatively small. Recall that the mathematics content test measured mathematics proficiency ranging from algebra to calculus.

The second research question was also answered using paired samples *t* tests. First, data gathered using the attitudes toward mathematics instrument were

analyzed. The results of the paired samples *t* test (two-tailed) reveal a statistically significant difference between pretest scores ($M = 3.06$, $SD = 0.451$) and posttest scores ($M = 3.34$, $SD = 0.356$) for the attitudes toward mathematics instrument with $t(21) = -6.131$, $p = 0.000$, $d = 0.48$. This means there was a statistically significant increase in attitude toward mathematics over the course of the semester. The effect size is in the medium range. Recall that the attitudes toward mathematics instrument measured attitudes toward mathematics including self-confidence, value, enjoyment, and motivation in mathematics.

The third research question was answered using independent samples *t* tests. There were 10 middle school teachers and 12 high school teachers in this study. The results of the independent samples *t* test (two-tailed) reveal a statistically significant difference between pretest scores for middle school teachers ($M = 72.20$, $SD = 15.135$) and high school teachers ($M = 84.75$, $SD = 12.076$) for the mathematics content test with $t(20) = -2.165$, $p = 0.043$, $d = 1.20$. This means high school teachers performed significantly better on the mathematics content pretest than did middle school teachers and the effect size was very large.

The results of the independent samples *t* test (two-tailed) reveal a statistically significant difference between posttest scores for middle school teachers ($M = 73.60$, $SD = 18.804$) and high school teachers ($M = 90.67$, $SD = 9.442$) for the mathematics content test with $t(20) = -2.763$, $p = 0.012$, $d = 1.18$. This means high school teachers performed significantly better on the mathematics content posttest than did middle school teachers and the effect size was very large.

Due to the interesting results when separating middle and high school teachers, it can be seen that, from the mathematics content pretest to posttest, middle school teachers went from a mean score of 72.20 to 73.60. This prompted a paired samples *t* test to see if this small difference was significant. The results of the paired samples *t* test (two-tailed) reveal no statistically significant difference between pretest scores ($M = 72.20$, $SD = 15.135$) and posttest scores ($M = 73.60$, $SD = 18.804$) for mathematics content with $t(9) = -0.615$, $p = 0.554$. This means the gains in content proficiency can mostly be attributed to the high school teachers.

The fourth research question was answered using independent samples *t* tests. Again, there were 10 middle school teachers and 12 high school teachers in this study. The results of the independent samples *t* test (two-tailed) reveal a statistically significant difference between pretest scores for middle school teachers ($M = 2.76$, $SD = 0.335$) and high school teachers ($M = 3.32$, $SD = 0.379$) for the mathematics attitudinal test with $t(20) = -3.597$, $p = 0.002$, $d = 1.56$. This means high school teachers had significantly better attitudes toward mathematics than did middle school teachers and the effect size was very large.

The results of the independent samples *t* test (two-tailed) reveal a statistically significant difference between posttest scores for middle school teachers ($M = 3.14$, $SD = 0.287$) and high school teachers ($M = 3.50$, $SD = 0.332$) for the mathematics attitudinal test with $t(20) = -2.677$, $p = 0.014$, $d = 1.15$. This means high school teachers had significantly better attitudes toward mathematics than did middle school teachers and the effect size was very large.

The fifth and sixth research questions were answered using one-way ANOVA. TFA teachers were grouped according to their undergraduate college major. Three categories were used to group teachers: social science ($N = 8$), business ($N = 9$), and mathematics ($N = 5$) related majors. For the mathematical content proficiency pretest, the one-way ANOVA revealed a statistically significant difference, $F(2, 19) = 5.244$, $p = 0.015$ (see Table 1). A post hoc test (Tukey HSD) was performed to determine exactly where the means differed. The post hoc test revealed that mathematics related majors had significantly higher content proficiency on the pretest than did business related majors, $p = 0.012$. There were no other statistically significant differences. For the mathematical content proficiency posttest, the one-way ANOVA revealed a statistically significant difference, $F(2, 19) = 5.244$, $p = 0.014$ (see Table 1). A post hoc test (Tukey HSD) was performed to determine exactly where the means differed. The post hoc test revealed that mathematics related majors had significantly higher content proficiency on the posttest than did business related majors, $p = 0.015$. There were no other statistically significant differences.

For the mathematics attitudinal pretest, the one-way ANOVA revealed a statistically significant difference, $F(2, 19) = 5.039$, $p = 0.018$ (see Table 1). A post hoc test (Tukey HSD) was performed to determine exactly where the means differed. The post hoc test revealed that mathematics related majors had significantly better attitudes toward mathematics on the pretest than did business related majors, $p = 0.016$. There were no other statistically significant differences. For the mathematics attitudinal posttest, the one-way ANOVA revealed a no statistically significant differences, $F(2, 19) = 3.425$, $p = 0.054$ (see Table 1). This means there were no significant differences found between the majors using the mathematics attitudinal posttest.

The seventh research question was answered using an independent samples *t* test as well as an analysis of teachers' reflective journals. Attitude scores collected at the end of the year had a mean of 3.34 and standard deviation of 0.356. An independent samples *t* test was conducted to determine if the participants had significantly better attitudes toward mathematics at the end of the semester as compared to a neutral value coded as "2" on the survey sheet. The results of the independent samples *t* test (two-tailed) reveal a statistically significant difference between attitudinal scores ($M = 3.34$, $SD = 0.356$) and neutral scores ($M = 2.00$, $SD = 0.000$) with $t(42) = -17.653$, $p = 0.000$ (equal variance not assumed). This means that the teachers had statistically significant better attitudes toward mathematics than a neutral value of "2". It should be

noted, however, that comparing actual attitudinal scores with neutral responses should be interpreted with caution.

Teachers were required to keep two journals: learning and teaching. The learning journal was a reflection on what teachers were learning in their graduate education courses. The teaching journal was a reflection on their personal teaching.

Table 1
Means and Standard Deviations for Pre and Post Tests for Content Proficiency and Attitudinal Scores

Pre and Post Tests	Mean	Standard Deviation
Content Proficiency Pre Test		
Social Sciences (*N* = 8)	79.75	10.124
Business (*N* = 9)	70.67	16.310
Mathematics (*N* = 5)	93.00	4.183
Total (*N* = 22)	79.05	14.679
Content Proficiency Post Test		
Social Sciences (*N* = 8)	86.63	9.855
Business (*N* = 9)	72.11	19.225
Mathematics (*N* = 5)	96.40	3.362
Total (*N* = 22)	82.91	16.550
Attitudinal Pre Test		
Social Sciences (*N* = 8)	2.99	0.441
Business (*N* = 9)	2.87	0.386
Mathematics (*N* = 5)	3.53	0.246
Total (*N* = 22)	3.06	0.451
Attitudinal Post Test		
Social Sciences (*N* = 8)	3.27	0.403
Business (*N* = 9)	3.22	0.289
Mathematics (*N* = 5)	3.67	0.192
Total (*N* = 22)	3.34	0.356

Analysis of the learning journal revealed that the most often mentioned topic by the teachers was social justice and empowering education. TFA teachers generally felt that learning how to promote social justice and teach students for social and economic empowerment instead of teaching for control and submission (Finn, 1999) was productive. Further, the teachers felt that discussions with fellow classmates on best practices as well as what successes and failures they had in the classroom was very effective. At the beginning of every class, a problem solving situation was given to the teachers that was in line with the

National Council of Teachers of Mathematics' (NCTM) *Principles and Standards* (2000). Many teachers expressed that this was very helpful for them. Other

Table 2
Analysis of Learning Journals

Topic	Frequency by Teacher
Social Justice and Empowering Education	12
Best Practices, Success, and Failures Discussions	11
Problem Solving	8
Numeracy	6
Motivation Techniques	3
Wiggins & McTighe (2005) Backwards Design	3
Literature Critiques	2
Microteaching	2
Himley & Carini (2000) Descriptive Review	2
Reflecting on Teaching	2

Table 3
Analysis of Teaching Journals

Topic	Frequency by Teacher
Classroom Management Issues	15
Standardized State Examinations	10
Student Motivation for Learning and Attendance	9
Unsupportive Administration	4
Lack of Student Conceptual Understanding	4
State and NCTM Standards	2

topics mentioned in the journals included developing numeracy in students (Paulos, 1990), techniques to motivate students, and self-reflections on their own teaching. Further, each of the teachers was required to teach a brief lesson to the class that would be critiqued afterwards. Two teachers expressed appreciation for this exercise. Teachers were also required to critique two articles from the research literature. Again, two teachers expressed appreciation for this assignment. Finally, several teachers mentioned appreciation for learning how to use Backwards Design (Wiggins & McTighe, 2005) and Descriptive Review (Himely & Carini, 2000). Backwards Design is a technique in which the following three steps are taken when planning for instruction: (a) Identify desired results, (b) determine acceptable evidence, and (c) plan learning experiences and instruction. This differs from traditional lesson planning in that assessment is considered before the instructional activities are planned. This is advantageous since acceptable evidence of objectives being met is determined before planning instruction. Descriptive Review is a technique used to understand individual students better. Teachers observe a student, noting five different aspects of the student: (a) Physical presence and gesture, (b) disposition and temperament, (c) connections with other people, (d) strong interests and preferences, and (e) modes of thinking and learning.

Analysis of the teaching journal revealed that the most often mentioned topic was issues in classroom management. Many new TFA teachers claimed to have struggled with controlling student behavioral problems. A secondary concern was preparing for the standardized state examinations. In the era of No Child Left Behind (NCLB, 2001) there is a major concern for accountability that teachers and administrators must satisfy. Preparing students to pass such examinations is a major concern for the TFA teachers. A concern related to classroom management is student motivation for learning and student attendance. Many TFA teachers expressed concern regarding apparent student apathy as well as their lack of attendance in the classroom. Further, some others expressed concern about student lack of understanding. Some students may be able to perform procedural calculations, but may lack conceptual understanding. Finally, several teachers expressed that they had an unsupportive administration and were concerned with satisfying state and NCTM standards.

Discussion

It was found that first year TFA teachers increased their mathematical content proficiency over the course of the first year of teaching and taking graduate education courses, as well as improved their attitudes toward mathematics over the first year. Due to relatively high content proficiency among teachers in this study, there is confirmation of results presented by TFA regarding teacher content proficiency (TFA, 2008b). TFA claims that principals said that generally TFA teachers are knowledgeable in their subject matter in the Teach for America 2007 National Principal Survey.

High school teachers had significantly higher content proficiency scores and better attitudes toward mathematics, on both pre- and posttests, than middle school teachers. Further analysis revealed that most of the significant gains in content proficiency among TFA teachers can be attributed to the increase in content proficiency of the high school teachers. Additionally, it was found that mathematics related majors had significantly better content proficiency scores on the pre- and posttests and better attitudes toward mathematics on the pretest than did business related majors. Finally, it was found that, after a year of teaching, TFA teachers had significantly better attitudinal scores than neutral. They generally believed the emphasis on social justice and empowering education was of biggest benefit to them and that classroom management was the biggest problem they faced in their teaching.

The results of this study are not very surprising. It was expected that there would be an increase in content proficiency and attitudes toward mathematics over the course of the first year teaching and taking graduate education classes. However, it was disappointing that middle school teachers did not share the content proficiency gains that high school teachers did. This further strengthens the argument for the need for more content proficiency for middle school teachers. At least in the context of this study, it can be argued that new middle school teachers in an alternative certification program need more content proficiency. Further, it wasn't surprising that mathematics related majors had significantly better content proficiency than did business majors. However, it is surprising that mathematics related majors did not have better content proficiency than social science majors. This should be further investigated in future research.

It is not surprising that teachers most often mentioned classroom management, standardized state examinations, and student motivation as the biggest issues they faced in their classrooms. More research should be conducted on first year teachers' teaching experiences. However, it was pleasantly surprising that teachers often mentioned social justice and empowering education as the most important topics learned in their teacher education courses during the first year. Social justice is a major emphasis in the school of education at the university in which this research was conducted.

The major limitation of this study is the small sample size due to availability of TFA teachers. Unfortunately, not many mathematics TFA middle and high school teachers were available for this study in the city in which this study took place. Future studies should increase the sample size when practical or study mathematics TFA middle and high school teachers from more than one city.

The author of this study is hopeful that more much needed research will be conducted at the secondary level for alternative certification, specifically in the TFA program. Understanding new TFA teachers' mathematics content proficiency and their attitudes toward the subject is important for professors of education to guide teacher educator instruction as well as provide much needed

support for new teachers. Given the short amount of time many TFA teachers stay in the profession, some would argue that this may be a waste of resources. However, for the future of many of the urban students who have TFA mathematics teachers in their classrooms, improvement in new TFA teacher education is of utmost importance. It is for their sake that research on alternative education is necessary.

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