

ALGEBRA FOR EVERYONE?

Student Perceptions of Tracking in Mathematics

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This research explored the experiences of students in a school district that limited early access to the study of algebra and to inform education policymakers of the impact of such tracking policies on the lives and futures of the students. Quantitative analysis had already yielded a snapshot of inequities deriving from the policies surrounding placement in 8th grade as well as significant benefits deriving from that placement. Subsequent interviews with students provided a vital portrait of the faces behind this analysis. The candid and reflective interviews with these graduating seniors suggest that 8th-grade mathematics experiences impacted their academic and social experiences as well as their future plans. Regardless of their group, the students concluded that the policy of assigning students to algebra in the 8th grade was based on developmental behaviors, like study habits and self-discipline, rather than on cognitive ability. Students in both groups criticized the school's emphasis on the state's standardized tests and regarded those tests as basic and minimal. The students also chronicled the long-term effects of studying 8th-grade algebra in 8th grade, primarily the academic benefits of the type and number of mathematics courses afforded early algebra students. According to students in both tracks, algebra instruction for all students in eighth grade would level the playing field and open the gates to advanced study for those students who choose to take advantage of those opportunities. Providing algebra to all students, with additional academic and institutional support if necessary, would diminish the disparity of outcomes and promote more equitable opportunities for all students.

INTRODUCTION

To what extent can student input inform policymakers about the study of algebra in the eighth grade? Striving to increase mathematics literacy among all populations, education policymakers frequently rely on quantitative analyses of standardized test scores to inform their decision making about this critically important

question. However, students' perspectives can inform education policymakers about the sustained impact of selective acceleration on mathematics literacy and among students' course-taking patterns. At district and local levels, test scores have become the driving force behind efforts to address the achievement gap among underserved populations. While this global view of student achievement

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provides a certain macrolevel understanding of the efficacy of such efforts, interviews with the principal stakeholders, the students, offer an in-depth perspective of the programs that have been designed for their benefit.

The purpose of this research was to explore the experiences of students in a school district that limited early access to the study of algebra and to inform education policymakers of the impact of such tracking policies on the lives and futures of the students. This study examined the effects of early access to algebra in a large urban/suburban school district that provided algebra instruction only to some students in eighth grade. Quantitative analysis had already yielded a snapshot of inequities deriving from the policies surrounding placement in eighth grade as well as significant benefits deriving from that placement. Subsequent interviews with students provided a vital portrait of the faces behind this analysis. The lived experiences of these students, along with their reflections on the phenomenon of tracking, present serious considerations for policymakers seeking to provide equitable access to advanced curriculum for all students. The results of this study support offering algebra to all students in the eighth grade based on the conclusions of students who experienced both academic tracks.

THEORETICAL FRAMEWORK

In 1989 the National Council of Teachers of Mathematics recommended that schools promote increased mathematics literacy for all students regardless of ability. Shortly thereafter, the National Center of Education Statistics (NCES) of the United States Department of Education found that effective middle schools offered algebra to eighth-grade students (NCES, 1994). Subsequently, Smith (1996) concluded that “early access to algebra has a sustained positive effect on students, leading to more exposure to advanced mathematics curriculum and, in turn, higher mathematics performance by the end of high school” (p.

148). More recent National Assessment of Educational Progress (NCES, 2001) data show that students who have early access to algebra, in the eighth or even seventh grade, do as well as or even better on state standardized tests than their peers who have not studied algebra. These results do not answer the question of whether all students should study algebra in eighth grade, an issue that remains controversial in light of the current accountability mandates that govern schools. In fact, Schiller and Muller (2003), in their meta-analysis of state mandated mathematics testing and course-taking patterns, cautioned specifically about the connection between accountability of schools and the courses that they provide students. They found that increased consequences for schools regarding student performance on mandated high school mathematics tests, i.e. subject specific tests like algebra, lead to greater attrition in mathematics courses by underrepresented populations. In other words, minority students who might not succeed because of perceived risk factors frequently do not take higher mathematics level courses and are not granted access to the study of algebra in eighth grade. This study provided an additional backdrop for this study’s exploration of the effects of tracking policies from the point of view of the students affected by such policies that preclude them from advanced mathematics options.

Tracking students has been a longstanding, albeit controversial, convention of mathematics instruction in secondary schools. The implications of mathematics tracking have been documented in recent years. The sequential nature of mathematics study precludes students from studying calculus in high school unless they study algebra in eighth grade (Assouline & Lupkowski-Shoplik, 2005). Since algebra is the gatekeeper course to advanced study in both mathematics and science, Smith (1996) proposed offering algebra in eighth grade to all students in order to address the decline of achievement in high schools in the United States. Students who wait for ninth grade to begin the study of alge-

bra must double-up on mathematics courses if they are to be able to take calculus in 12th grade. Studying calculus in high school provides a basis for taking mathematics courses in college. Gamoran and Hannigan (2000) maintained that regardless of their long-term plans, students benefit from the nature of the content of more advanced mathematics courses in high school.

Equally compelling has been the research on the lack of rigor in many middle school mathematics courses. Twenty years ago, Dosssey, Mullis, Lindquist, and Chambers (1988) connected mathematics literacy to providing an informed workforce and claimed that because of low level mathematics instruction, “the United States risks forfeiting its competitive edge in world and domestic markets” (p. 9). The study of algebra in eighth grade by all students has been offered as a remedy to poor showing in the international arena. In their examination of U.S. performance on the TIMSS and TIMSS-R, Greene, Herman, and Haury (2000) concluded that “The 8th-grade mathematics curriculum in the U.S. seems comparable to the average 7th-grade curriculum for other participating countries, putting U.S. students a full year behind their global counterparts at age thirteen” (p. 2). Subsequently, Cogan, Schmidt, and Wiley (2001) focused policymakers on strengthening mathematics literacy initiatives, particularly in the nation’s middle schools, as a means of providing the basis for more rigorous work in high school. Schmidt (2003) also noted that students in the United States showed little or no gain in mathematics from eighth to 12th grade, a problem they claimed was the result of a “middle school curriculum lacking coherence, with little rigor or extreme variability in learning opportunities as a consequence of tracking policies” (p. 278). Since algebra is the gatekeeper course to advanced study in mathematics and science, eighth-grade algebra for all students could begin to address the decline of achievement in high schools in the United States.

CONTEXT OF THE STUDY

This study is based on prior research by the author (Spielhagen, 2006) that examined early access to algebra in a large urban/suburban school district. The school district under study, located in the suburbs of a large city in southeastern United States, was selected for the size and diversity of its student population ($N = 60,000$) and the range of socioeconomic characteristics among the district’s 36 elementary schools, 10 middle schools, and 10 high schools. This quantitative analysis did not support tracking students into two separate groups for algebra. Group membership did not guarantee higher achievement. In fact, grouping reinforced existing achievement patterns. Descriptive analysis revealed disproportionate representation of minority students in the 8th grade algebra group. Logistic regression further revealed that minority students had a less than even chance of getting into the early access group. Moreover, additional analysis of the composition of the two groups revealed an overlap in the entrance credentials of students in the algebra access (Group A) and among those (Group B) who did not have early access to algebra (Spielhagen, 2007). Some students who did not study algebra in eighth grade had the same standardized entrance test scores of those who were afforded that opportunity. At the same time, access to algebra in eighth grade provided long-term benefits since students stayed in the mathematics pipeline longer and gained greater access to college. Therefore, these prior quantitative studies led to the exploration of the students’ views of the disparity of access and their experiences in the mathematics tracks in this district, in order to explore what actually was happening to the students in the tracking scenario. Students in the two separate groups (those who had studied algebra in eighth grade and those who had not) reflected on their academic experiences and the opportunities afforded by their mathematics tracks.

RESEARCH PROTOCOL

The sample of interview candidates was drawn from the original dataset, which consisted of three cohorts of students (N = approximately 2,500 to 3,000 students in each cohort) in their eighth-grade year. The third cohort (N = 2,634) had been in the eighth grade in the 1999-2000 school year. From this last cohort (i.e., students who were preparing to graduate from high school in 2004) a purposeful sample of 30 students was extracted from among three high schools that represented three socioeconomic (high, middle, and low SES) benchmarks within the scope of the entire district. Ten students from each of the high schools received letters requesting their parents to sign permission slips allowing their children to participate

in interviews regarding their high school mathematics experiences. Ultimately, 12 students assented to the interviews (yielding a 40% return rate to the request for interviews.) These students spoke candidly about the plans and decisions that had evolved from their earlier mathematics experiences. While the purposeful sample sought to gather a set of interviews balanced according to SES, no attempt was made to delineate the group further. Nevertheless, the resulting sample (Table 1) resulted in serendipitously equitable composition according to three key variables: algebra group, gender, and race.

Interviews lasting approximately 40 minutes involved individual students according to their algebra group: those who had studied Algebra 1 in eighth grade (Group A) and those

TABLE 1
Demographic Analysis of Interview Sample Population

#	Math Group	M/ F	Race	GPA	SAT	Years HS Math	Most Recent Math Course	Most Recent Math Grade	College Plans	Goals
1	A	F	W	4.56	1,300	4	Calc A/B	A/B+	4 yr	Undecided (public relations?)
2	A	M	W	4.59	1,240	4	Calc A/B	B	4 yr	Architecture?
3	A	F	B	3.97	1,110	4	Calc	B+	4yr	Doctor
4	A	M	W	3.6	1,160	4	AP Calc	A	4 yr	Architecture
5	A	M	B	3.72	1,110	4	IB Math Meth 2	B	4 yr	Elementary teacher
6	A	F	B	4.24	1,200	4	IB Math Meth 2	B	4 yr	Law school Fashion
7	B	M	W	3.1	980	3	Alg 2	D	4 yr	Undecided
8	B	M	B	2.0	—	4	Geom repeated	C+	2 yr	Own a barber shop
9	B	F	B	2.7	1,020	4	Adv. Alg/Trig	C	4 yr	Success in business
10	B	F	B	3.6	900	4	Trig Comp Sci	A	4 yr	Computer engineering
11	B	M	W	3.84	1,040	4	Trig Analysis	B+	4 yr	Doctor (ophthalmology)
12	B	F	W	3.4	1,190	4	Adv. Alg/Trig	A	4 yr	Elementary teacher

Key: Group A = 8th-grade algebra; Group B = 9th-grade algebra; Calc = calculus; AP = Advanced Placement; IB = international baccalaureate; Alg = algebra; Comp Sci = computer science; Geom = geometry; Math Meth = mathematics methods; Trig = trigonometry.

who did not (Group B). The interviews were conducted over a period of 2 weeks in early June, 2004, at the students' schools. The timing of the interviews was selected to coincide with the end of state exams and the interim before graduation week events. Students met the interviewer during free periods and in neutral settings, such as the library conference room, that provided for confidentiality and comfort. Their impending graduation encouraged an atmosphere of freedom of response and candor during the interviews. One student, having just finished his last year-end examination, remarked exuberantly, "I'm out of here. What do you want to know? I'll tell you!"

Students were asked seven basic questions about their mathematics experiences in both middle school and high school (Table 2), to which they were encouraged to respond freely and expand on their answers. Transcripts of the interviews were later read in their entirety and then coded by the principal investigator for key words, phrases, and unifying concepts. Independent analysis of the transcripts by a research assistant validated the themes that had been identified.

These transcripts yielded rich insights and reflections concerning the effects of mathematics tracking on the students' academic achievement and career goals that were entered into a matrix and coded for common responses. The descriptive language of the students provided a lens into the reality they experienced in their individual mathematics

classes. The basic interview questions set the stage for expanded student responses regarding their experiences as they advanced from eighth grade through high school. The students freely shared on their recollections and thoughts about the mathematics courses they took and their academic and social experiences in high school. As a result of these processes, several themes emerged that provide an overall description of the "meaning and essence of the experience" (Creswell, 1998) of these students. Discussion of these themes can further inform researchers and mathematics educators about the experience of mathematics acceleration in middle schools.

PROFILES AND THEMES

As a whole, all of these students were optimistic about their future plans, but there were some differences in the two groups of students. Those who had studied algebra in eighth grade (Group A) reflected positively about their academic experiences, were planning to attend 4-year colleges, and expressed specific professional career goals. Those who had not studied algebra in eighth grade (Group B) also expected to attend college, but two of the students were less specific in their future plans. They were emphatically less enthusiastic about their high school mathematics experiences and had taken fewer high school mathematics

TABLE 2
Interview Questions

1.	I'm interested in your remembrances of yourself as a middle school student. What do you recall about yourself as a student?
2.	What do you recall about your math classes?
3.	What effect, if any, did your math classes have on your school experiences in eighth grade?
4.	Now I'd like to hear about high school. Can you tell me about your experiences in high school math classes?
5.	Did your mathematics experience affect your other high school experiences in any way?
6.	Do you feel that your mathematics experience have provided any advantages or disadvantages regarding your current academic experiences?
7.	Is there anything about your high school math experience that you would have liked to have been able to change?

courses than their peers who had studied algebra in eighth grade.

The students' reflections corroborate quantitative analysis of outcome data related to the entire cohort (Spielhagen, 2007), which revealed that taking algebra in eighth grade correlated with increased mathematics course taking in high school and greater college attendance. The students' accounts of their experiences as both middle and high school students are informative because they provide a personal perspective on traditional mathematics curriculum policy. Some of their insights seem self-evident and confirm conventional understanding of adolescent educational experiences, but other themes provide interesting discussion material for mathematics educators about what actually occurs in secondary mathematics classes.

Theme #1: For students, social concerns dominate middle school academics.

Since the mathematics tracking policy focused on middle school performance, the students were first asked to reflect on their behaviors as middle school students. Overall, these high school seniors all recalled the extremely social nature of their interactions in middle school, particularly eighth grade. One female student, who had been in algebra in eighth grade, described herself as studious and hard-working. She noted that her social life revolved around her algebra placement, explaining, "Most of my friends were in Algebra 8." A male student in the same class described himself as "shy" and commented on the social interactions that characterized middle school in general. "Middle school was more clique-y than elementary school." Students who confirmed the prevalence of the middle school "cliques" further asserted a connection between cliques and the separation of the groups according to their academic experiences. A female honors student noted that she had been in classes with all the same people since eighth grade, adding "People make fun of us. We're all in the top 10. We've been friends since eighth grade ... but I felt like they

separated us from the rest of the students." In this statement, she captured the essence of the tracking experience that provided academic benefits and a particular social set that reinforced their academic status but also seemed isolating to at least one student.

On the other hand, the social nature of the middle school experience did not seem to provide many academic benefits for those who did not have algebra in eighth grade. A male student in the non-algebra group admitted that he had not studied much in eighth grade, noting somewhat ruefully about the social environment of his math class, "A lot of my friends were in my class. They helped me be social, too social." He concluded, "Math would have been better if I had been in class with no friends!" A female student, also in the pre-algebra class in eighth grade, asserted that her study habits improved as she matured, "I was more social in middle school. I didn't get as good grades as I get now." A male student in Group B noted that he had been a poor student in seventh grade and did not care about school. He felt that he was not selected for the 8th grade algebra group because of his behavior, which then changed in eighth grade. He reported, "I made better choices in eighth grade. I don't know why. School began to make sense."

Theme #2: Students perceived that their social development affected their placement and success in mathematics classes.

The students discussed the varying role played by academics in their middle school experience. Students in the eighth-grade algebra group (Group A) described themselves as studious and involved in school activities. A few recalled not being challenged and not having to study, except in algebra class. Students in Group B noted their poor study skills and the importance of being with their friends. A few commented that they missed their friends, who were in algebra, but several students remarked on the benefit of doing easier work for a higher grade, especially those who had been selected for eighth-grade algebra but had

opted for the regular eighth-grade mathematics course. One male student, who was very interested in sports, recalled that “Grades were my motivation to drop eighth-grade algebra. It was a confidence booster when I did and got good grades.”

Student perception of the selection process for algebra in eighth grade was that student behavior was the criterion by which teachers chose students for eighth-grade algebra. Even though district policy involved an “algebra readiness” test, students in neither group mentioned being tested to get into algebra. Instead, they all spoke of class grades and teacher selection. One female student strongly lamented the fact that she had not been selected to study algebra in eighth grade and also noted that a friend of hers with lower grades did get into algebra, but then dropped down into pre-algebra. Other students in Group B expressed mixed reactions to their situation, especially in relationship to their peers in Group A. However, one pointed out that the separation of math classes had a definite impact on her social environment because she recalled feeling lonely and left out of her crowd of friends.

Theme #3: Studying eighth-grade algebra is rigorous but provides important training and foundation for coursework in high school.

Students in Group A reported that their 8th grade algebra class was not as challenging as their subsequent high school classes, but it did provide necessary skills for transition into high school courses (not just math.) They explained that the work of the algebra class was more rigorous than the mathematics work in earlier grades. A female student in Group A recalled that the work was more challenging than math work she had done prior to eighth grade. “Sixth grade was fun, but I didn’t learn anything. In seventh grade the teacher was mean, but the work wasn’t that hard. Before 8th grade algebra, I didn’t need extra help. I had to have tutoring in algebra in eighth grade.” A male student in Group A concluded, “I’m glad I pushed myself for the harder program. I feel

better prepared for college.” Another male student in Group A concurred, “At times it was a struggle. I was not used to the pace, but I felt I could do it.” Yet another student in Group A described her 8th grade algebra teacher as demanding and challenging, different from the other middle school teachers and concluded, “That teacher helped me make the transition to high school.”

On the other hand, students in Group B consistently remarked about the ease of their 8th grade pre-algebra course. A male student in Group B said that his 8th grade math class was so easy that he didn’t take it seriously. “I could have done better. Math was easy, so I would slack off and not do the homework. I could have gotten a higher grade.” A female student in Group B, who had been accelerated in elementary school but opted to take pre-algebra for the easier pace it presented, ultimately regretted that decision. “I should have taken algebra. It would have been a lot harder and I would have needed outside help, but I could have done it. Now I have to take calculus in college and pay for it.” Another female student in Group B described her regular 8th grade math class as boring. “It was the easiest class I had. It gave me more time to do other things.” However, she also noted, “My friends were in algebra and complained about it being hard. I wanted to be a part of it and see what they were talking about.”

Theme #4: Studying algebra in eighth-grade provides long-term benefits.

Overall, Group A reported that their higher level math experiences enhanced their overall confidence, pushed them to achieve, prepared them for science classes, and influenced their career plans. They felt that the teachers in high school math classes helped them succeed and that the challenge of the advanced math track provided good experience, caused them to balance their time better, and helped with their SAT scores. They universally cited their membership in the National Honor Society and/or the National Math Honor Society, as benefits of their math experiences, as well as being

involved as peer tutors. They considered math contests and awards as the “perks” of being in the advanced class and positive components of their college applications. Moreover, they enjoyed the competition and the fellowship of being on the teams. One noted that he decided to become a math teacher because of his 8th grade algebra experience. Another student reported that he felt like he could have a “high level of conversation” with his advanced math peers. He explained that his friends in the other courses blamed the teachers for their grades, rather than take responsibility for their own learning. However, a female student decried the academic separation, “I felt like they separated us from the rest of the student body. This made us stronger academically but limited our interactions.”

In contrast, Group B students generally felt that their placement had negative effects on their high school experience and future plans. They criticized their math courses and the teachers, citing incompetence and lack of experience. One speculated that his SAT scores might have been higher had he had other math courses and other math teachers. That student ultimately did not take four years of math, a decision that deprived him of the opportunity to earn an advanced diploma. “When I realized that I could not get an advanced diploma, I was really upset, but I got into college after all.” A student, who resented not being placed in algebra in eighth grade, noted that she devoted herself to computer science and got “A+ all the way.” She reiterated her frustration with the students in her regular math classes, adding “I wonder what it would be like to be with others who get it.” Still another female student concluded, “Twelfth grade is the first time I’ve actually learned math.”

Theme #5: Regardless of their placement, students felt that eighth-grade algebra was an important experience for all students.

In general, although they considered the state’s standardized tests too easy, Group A students were so satisfied with their math

experience that they recommended eighth-grade algebra as a universal option, especially since the state test assessed the most basic algebraic concepts. One boy advised, “More kids should take algebra in eighth grade. The state test was not that hard. I would recommend everybody to take it.” Group B students also criticized the state algebra test as being too basic and offering no challenge. They felt that their teachers spent too much time cramming for the test. A female student in Group B noted that the teachers she had in high school “teach according to the state test ... really basic stuff. Much of the work we did was not worthwhile. There was no pushing thinking to the limit.”

With the wisdom that comes with hindsight, Group B students all expressed regret at their math placement. Some bemoaned the fact that they had taken an easier route when they might have benefited from being in the higher track. Others resented not being given the opportunity to study algebra in eighth grade. Universally, Group B students felt that they had been judged on their immaturity rather than their ability. One boy said, “I would change my study habits in middle school. I could have done algebra in eighth grade. I would have struggled, but I could have done it. I didn’t question my placement and accepted it as an easy way to get a better grade.” Another male student concurred, “I wish I had paid more attention in middle school.” One girl in Group B lamented the longitudinal impact of not having algebra in eighth grade, a situation that precluded her enrollment in calculus in high school. “I would have wanted to be in calculus. If I were in calculus, I would have more challenge.”

LIMITATIONS

This study, while compelling in its own right, does have limitations, primarily related to the fact that the source of the interviews derived from one district, albeit a somewhat large one, in a specific area of the country. The original

research plan aspired to gather a purposeful sample of respondents. The complexities of identifying a suitable pool of students and communicating with them over several weeks resulted in the final set of interviews that was more a convenience sample. The interviews took place at the very end of the academic year, immediately prior to the students' graduation. This time consideration precluded securing additional participants for the study at that time. A follow-up study of students in subsequent graduation classes would contribute to the findings of the current study.

A second limitation derives from the lack of information on the content of each of the algebra courses, either in eighth or ninth grade. District policy dictated that the curriculum was uniform throughout the schools and all classes used the same textbooks. District officials reported that the curriculum addressed current NCTM standards and that teachers must follow detailed pacing guides, teaching the same topics in the same sequence. This information might provide a backdrop for the student's reflections on the actual mathematics instruction they experienced.

DISCUSSION

The study of algebra and tracking in mathematics continues to dominate the literature on mathematics literacy. Morgatto (2008), after summarizing the issues and conventional wisdom about offering algebra for all students, ultimately did not address the delivery of algebra in eighth grade. Recent research supports the insights gained from the students interviewed in this study regarding their experiences in tracked mathematics classes that allowed some of them to study algebra in eighth grade. Ma and Wilkins (2007) examined the extent to which mathematics coursework influenced the rate of growth in mathematics achievement in both middle school and high school. They found that advanced courses demonstrated the greatest

influence on student achievement. This influence may well be due to the level of discourse in the middle school mathematics courses (Piccolo, Harbaugh, Carter, Capraro, & Capraro, 2008), a factor noted by students in both groups when they discussed the ways in which teachers presented work in their eighth-grade math classes. On the other hand, as the students suggested, perhaps the middle school mathematics teachers simply used different pedagogical approaches because of the associations they made about the behaviors and motivation of students in each track (Reed, 2008).

The graduating seniors in this study spoke both reflectively and candidly of their experiences in secondary school related to their placement in mathematics in eighth grade. Their reflections indicate that eighth grade mathematics experiences impacted their academic and social experiences as well as their future plans. Regardless of their group, the students interviewed concluded that the policy of assigning students to algebra in the eighth grade was based on developmental behaviors related to early adolescence rather than on cognitive ability. They thought that study habits and self-discipline provided the basis for placement into the advanced track. Students in both groups criticized the school's emphasis on the state's standardized tests and regarded those tests as basic and minimal.

The students also chronicled the long-term effects of studying eighth-grade algebra in eighth grade. They recounted academic benefits in the type and number of mathematics courses afforded early algebra students. According to students in both mathematics tracks, algebra instruction for all students in eighth grade would level the playing field and open the gates to advanced study for those students who choose to take advantage of those opportunities. Providing algebra to all students, with additional academic and institutional support if necessary, would diminish the disparity of outcomes and promote more equitable opportunities for all students.

CONCLUSION

Good research can inform practice when it provides evidence of the results of policy decisions on the stakeholders for whom the policy is created. This study provides a lens into policymaking that is not commonly explored. By drawing upon the personal perspectives of students, this study contributes to the ongoing debate about the equity of middle school tracking policies and the efficacy of access to the study of eighth-grade algebra. The students' perceptions encourage education policymakers to reexamine the impact of rigid tracking policies on students' academic careers. Moreover, this study suggests that policymakers should reframe curriculum design to include flexible acceleration options throughout the middle school years. Finally, these students also called into question traditional curriculum designs that establish algebra as a gatekeeper course reserved for selected students before high school.

This conclusion leads to an essential question regarding appropriate curriculum for highly able students. If greater numbers of students can successfully study algebra in eighth grade, then what is appropriate differentiation for students who achieve that mastery at a faster pace? Van Tassel-Baska (2000) recommended that curriculum policy initiatives should take into account the needs of high ability learners but should also encourage course-taking access by underrepresented groups. If all students should study Algebra in eighth grade, then gifted students would be ready by Grade 6 or 7. Flexibility in course-taking is necessary to ensure learning progress for top students. Therefore, the paths by which students travel to the different tracks deserve scrutiny, as well as the existence and content of the tracks themselves. Algebra must be regarded as a milestone, not a goalpost, in the middle school curriculum.

These graduating high school seniors clearly explained—in strong, fresh, and honest voices—the impact of their eighth-grade math-

ematics experiences. They questioned the use of algebra as a delineator in eighth grade. Students in both mathematics tracks in this study clearly stated that the instruction they had in mathematics before the eighth grade did not prepare them for algebra and high school. Therefore, reframing mathematics curriculum must include more intense mathematics instruction in the intermediate grades. Advanced study options must be made available for highly able students but those options should not preclude rigorous curriculum for all students. Therefore, the study of algebra in eighth grade by all students emerges as a realistic approach to the improving mathematics literacy for all students.

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