

Practices Worthy of Attention
Building an Algebra Program
Evanston Township High School
Evanston, Illinois

Summary of the Practice. Evanston Township High School began reforming its mathematics program during the 2002–2003 academic year. They could not find a single recommended mathematics reform curriculum that suited their needs, so they developed their own program using several resources. They describe their new Algebra I program as comprehensive, since it incorporates many features beyond pedagogy, including issues of administrative support, teacher professional development, and structured student supports.

Need. Evanston Township High School reviewed their curricular programs and student performance by race/ethnicity and found fewer ethnic minorities succeeding in mathematics, specifically in Algebra I.

Goal. The goal of Evanston’s work is to improve student achievement in Algebra I, particularly for students who are not yet meeting standards, by standardizing their curriculum and teaching practices.

Demographics

Evanston Township High School, the only high school in the district, serves grades 9–12. Enrollment has held steady at about 3,100 students since 2002–2003 (see Table 1).

Table 1. Evanston Township High School Enrollment Data

Academic Year	Enrollment
2002–2003	3,148
2003–2004	3,118
2004–2005	3,103
2005–2006	3,164

Table 2 shows the percentage of students enrolled in and graduating from Evanston Township High School from 2002–2003 to 2005–2006 by race/ethnicity, limited English proficiency, and economic disadvantage. In 2005–2006, about 47% of students in Evanston were white and almost 37% were black. Almost 3% of Evanston students had limited proficiency in English, and 33% were classified as economically disadvantaged.

High school graduation rates have stayed somewhat stable over the years for all groups, though students classified as having limited proficiency in English or as economically disadvantaged have larger variations in performance across years compared to other subgroups. The graduation rate for Asian Americans dropped in 2004–2005, but this percentage drop may seem high due to the small number of Asian Americans enrolled. A

higher percentage of white students has graduated compared to Hispanic or black students over the four-year time span.

Table 2. Evanston Township High School Enrollment and Graduation Rates

Demographics	Academic Year	Percentage of Total Enrollment	Percentage Graduating
All Students	2002–2003	100	92.1
	2003–2004	100	92.2
	2004–2005	100	91.5
	2005–2006	100	90.2
Asian American	2002–2003	2.2	100
	2003–2004	2.1	100
	2004–2005	2.5	78.9
	2005–2006	3.2	87.5
Black	2002–2003	41.4	87.3
	2003–2004	41.3	86.7
	2004–2005	38.1	86.4
	2005–2006	36.6	88.6
Hispanic	2002–2003	7.5	85.7
	2003–2004	8.5	91.5
	2004–2005	9.1	86.7
	2005–2006	9.9	70.8
White	2002–2003	48.9	95.9
	2003–2004	48.0	95.8
	2004–2005	47.8	96.3
	2005–2006	47.4	96.6
Limited English Proficient	2002–2003	0.0	66.7
	2003–2004	1.6	87.5
	2004–2005	2.4	70.0
	2005–2006	2.7	53.8
Economically Disadvantaged	2002–2003	22.6	80.6
	2003–2004	31.3	93.1
	2004–2005	32.5	85.9
	2005–2006	33.0	79.9

Description of the Practice

Evanston Township High School saw an achievement gap between the performance of their white students and the performance of their black and Hispanic students on the state

mathematics assessment. Evanston is working on building student success in Algebra I, especially because research suggests that specific courses, such as Algebra I, serve as gatekeepers to high-level mathematics knowledge and can affect mathematics achievement in high school and beyond (Adelman, 2006; Ma, 2001). Their goal with this focus is to eliminate the differentiated performance and provide quality standardized mathematics education for all the students they serve.

The change began in 2002–2003, when the mathematics department examined the curricula to see what they liked and did not like about their mathematics courses. In 2003–2004, they developed a general outline for the content they wished to see in their Algebra I through Precalculus courses and piloted the new Algebra I curriculum in two classes with two different teachers. In 2004–2005, the department revised their pilot curriculum based on what they had learned, identifying what they now saw as the essential components of the Algebra I curriculum, including the mathematics knowledge, processes, and skills they wanted all students to master. An additional teacher joined the pilot group, and all three teachers reported student gains in conceptual understanding and deeper knowledge of the content.

Finally, in 2005–2006, Evanston implemented the new curriculum in all Algebra I classes and began development of the new Geometry curriculum. In 2006–2007, they began piloting the new Geometry curriculum with five classes as well as developing the new Algebra II curriculum. They plan eventually to require these three courses for high school graduation.

Evanston based their reformed Algebra I program on three practices that they are continuing to work on: (1) improving pedagogy, (2) encouraging students to take responsibility for their own learning through effort-based ability, and (3) using professional learning communities to standardize teaching and learning. Evanston describes their Algebra I program as having a comprehensive approach, where they consider curriculum, instruction, assessment, student engagement and motivation, personalization, scheduling, acceleration, interventions, professional community, and leadership capacity as integral pieces for creating change in Algebra I learning. They examined many of the major national reform curricula but decided one curriculum was not enough, so they created their own program with a variety of resources.

Evanston paid attention to several factors to help support the successful implementation of the new curriculum, including scheduling, training, common planning time, and student support. Evanston teachers are learning to encourage students to believe in “effort-based ability”—the idea that intelligence is built through hard work (Saphier, 2005). Through the use of effort-based ability discussions, teachers continually push students to try and work harder while also giving them the academic support they need. The teachers hope that students realize they can be responsible for their own learning and that the teachers will support them. The support network for students is established so that they feel that learning can be a safe place, because their teachers are there to help them succeed. Combine that with teachers focusing on students’ persistence and giving them the power to be in charge of their own learning, and students begin to view intelligence as a factor that can be improved with learning and habits of mind, and find ways to change their strategies and work smarter (Dweck, 2002).

Starting in 2005–2006, Algebra I classes were structured so there was more instructional time for all students. Immediately before the start of that year, the year when all Algebra I teachers would be using the reformed curriculum, teachers received three full days of hands-on training with sample lessons and instruction.

In every classroom, a large poster indicates the following:

Students will learn to make sense of mathematics: students will develop meaning for the mathematics they learn. They will internalize mathematical ideas, and gain a sense of personal ownership of the principles they encounter. They will learn to communicate mathematically: students will demonstrate mathematics orally and in writing. They will produce meaningful tables, charts, and diagrams. Students will explain not only what is true, but why those things are true as well.

Teachers appreciate that their goals for students' mathematics learning can be concrete like those on the poster. They encourage students to think about how to conceptualize a mathematics idea in different ways, showing that there is not just one "right" way to solve a mathematics problem. Students work in small groups to discuss an idea and then share their findings with the whole class; students feel comfortable asking questions of each other and of the teachers when they do not understand a concept.

To make sure struggling students receive support, the chair of the mathematics department meets individually with students who have failing grades to discuss their performance and talk about what kind of help they need. Algebra I teachers appreciate this personalized support and attention given to students, as they say they see positive changes in some students. Students in upper-level mathematics courses have been recruited to assist in Algebra I classes, helping students understand concepts and serving as teachers' aides.

Finally, Evanston tries to provide plenty of time for teachers to build professional learning communities, because research shows inconsistencies in instruction across classrooms within the same districts and schools. Though teachers in a given school may be using the same textbook, they still make independent decisions on what to teach and how to use their resources (Marzano, 2003). Stigler and Hiebert (1998, 1999) found that in addition to using different methods, schools within districts often do not even have common learning goals, and these differing methods and goals result in widely varying content and depth of instruction from one classroom to another.

Algebra I teachers in Evanston had a common planning time three periods per week to plan instruction, write documents to enhance the curriculum (including real-life activity examples), discuss the logistics of curriculum implementation, share stories of promising practices, and build team spirit and collegiality. This professional learning community provided teachers a place to standardize their expectations of Algebra I students and their use of Algebra I instruction and assessments, and a means to find common ways of building a positive classroom culture. Unfortunately, the money used for this common planning period was moved to programs for specific student support, so the Algebra I teachers now have only one common period per week to work together. However, they now also have 30 minutes each morning to work with struggling students.

Teachers also meet for the first period of every Monday to focus on professional needs, like reviewing common student work, monitoring student progress, and evaluating student achievement on common assessment problems. They also analyze the assessment data to determine which skills and concepts were unclear to students and discuss best teaching strategies to reteach these skills. In these meetings, teachers use strategic, measurable, attainable, results-oriented, time-bound (SMART) goals to measure their progress when changing instruction and assessments and seeing how well students are learning. They determine the essential outcomes of what they want students to do and write the goals accordingly, list ways they will measure those goals, collect student work, evaluate their teaching, and plan to reteach as needed.

Results

Evanston's research team surveyed both students and teachers about the changes to the mathematics program. Survey results show positive opinions about the changes. Algebra I teachers liked the new curriculum's problem-solving focus and the connections to real life. They reported that students understand the concepts better, and they felt they had received good preparation to deliver quality instruction. Over 80% of teachers felt that the training was adequate for preparing them to teach the course, that they have ongoing support, that their time scheduled for students is appropriate, and that the curriculum provides lessons with a problem-solving focus and is effective in teaching students. In addition, teachers found the common planning time crucial for thinking about teaching and learning together—analyzing student work, planning common assessments, talking about student expectations, and working out challenges or potential problems in lessons.

Surveys of students show understanding and appreciation of the curriculum: 91% of students agreed or strongly agreed that they understood the material in the course, 84% agreed/strongly agreed they were learning a lot in the course, 82% said they liked their Algebra I course, and 72% believed their Algebra I course is linked to real-life applications. The majority believed they were at least somewhat prepared for taking tests (92%), doing their homework (95%), and doing class work (97%). Most students thought the Algebra I course was interesting (in the double-block period, 75% agreed, and in the single period, 65% agreed).

Although the majority of students felt at least somewhat prepared to do homework and class work and take tests or quizzes, fewer felt as prepared to take tests and quizzes. Students in the single period of Algebra I felt more prepared for homework, class work, and tests or quizzes than those in double-block Algebra I. Students felt successful because they had a "great teacher who breaks down everything for me" or because they did their homework and class work. Students showed they were accountable for their learning, attributing lack of success to not turning in homework often. Students also liked Algebra I because they liked the way their teachers were there to help and that the teachers were "always happy to help out." One student commented, "It's fun and interesting and sometimes deals with real-life situations."

In 2006–2007, 350 students took Algebra I—60% were black, 20% were white, and 15% were Hispanic. Most freshmen were placed in Algebra I (46%) or Geometry (35%). Students who scored between the 25th and 50th percentile on the EXPLORE test (an ACT exam used to measure individual and grade-level student academic progress at grade 8 in Evanston) were

placed in double-period Algebra I. Students scoring below the 25th percentile were placed in Pre-Algebra, and the remaining students were placed in either Algebra I or Geometry.

Although the new Algebra I curriculum was only in its second year when this report was written, student performance was promising. A slightly higher percentage of students were getting grades of A and B in the second semester than in the first semester, and the percentage of failing grades decreased significantly for students in the double-block period (see Table 3).

**Table 3. Evanston High School District Algebra I Semester Grades:
Percentage Falling into Each Grade Category**

Year	Semester	A and B grades		D and F grades	
		Double Period	Single Period	Double Period	Single Period
2004–2005	First	30	37.5	46	19.5
2004–2005	Second	34	39	28	28
2005–2006	First	23	47	40	9
2005–2006	Second	33	45	16	27

The mathematics department uses a common final exam each semester. The final exams for 2005–2006 were new and more difficult than the exams given the year before. Test scores did not indicate that students performed better on the new final exams. Table 4 shows the exam scores for students in both semesters of both years of the new Algebra I program.

**Table 4. Evanston High School District Algebra I Semester Exam Scores:
Percentage Falling into Each Grade Category**

Year	Semester	A and B grades		D and F grades	
		Double Period	Single Period	Double Period	Single Period
2004–2005	First	25	39	55	44
2004–2005	Second	20	42	22	48
2005–2006	First	28	60	56	25
2005–2006	Second	24	48	59	27

Table 5 lists the Prairie State Achievement Examination mathematics results from 2001–2002 to 2005–2006 in Evanston and in the state of Illinois for grade 11 by race/ethnicity, limited English proficiency, and economic disadvantage. The performance of all students and for each subgroup in Evanston is higher than the state's performance. White students were the highest performers in Evanston, with close to 90% of students passing the mathematics exam in 2004–2005. Only 33.5% of black students and 42.8% of Hispanic students passed the mathematics exam. The achievement gap did not change over the five years of testing. The performance of students with limited English proficiency was well below that of students across the state over the first two years, but those students began to close the gap in 2003–2004. Economically disadvantaged students in Evanston performed better than students with

limited English proficiency across all years, with performance at grade 11 very close to that of state students' mathematics performance.

**Table 5. Evanston High School District
Prairie State Achievement Examination Mathematics Results**

Demographics	Academic Year	Grade 11 Percentage Met/Exceeded Standard	
		Evanston	State
All Students	2001–2002	64.8	53.6
	2002–2003	63.8	53.3
	2003–2004	61.2	53.1
	2004–2005	62.1	52.8
	2005–2006	65.0	53.7
Black	2001–2002	32.7	19.4
	2002–2003	32.5	20.5
	2003–2004	25.2	20.4
	2004–2005	28.7	18.6
	2005–2006	33.5	20.8
Hispanic	2001–2002	37.5	28.8
	2002–2003	40.5	29.5
	2003–2004	38.0	30.7
	2004–2005	39.4	30.8
	2005–2006	42.8	33.5
White	2001–2002	88.1	62.8
	2002–2003	87.7	62.6
	2003–2004	89.6	62.5
	2004–2005	86.9	63.0
	2005–2006	89.6	63.6
Limited English Proficient	2001–2002	11.8	30.9
	2002–2003	10.0	24.8
	2003–2004	22.7	26.1
	2004–2005	*	30.0
	2005–2006	*	*
Economically Disadvantaged	2001–2002	27.2	24.0
	2002–2003	29.3	24.9
	2003–2004	20.3	25.5
	2004–2005	24.2	25.5
	2005–2006	31.0	27.5

Note: The asterisk (*) notes that data were not available.

Conclusions

Evanston Township High School has invested a significant amount of time and support in a new Algebra I curriculum and is currently finding ways of evaluating the implementation and effects on teachers and students. Teachers feel they have regular support and a reasonable amount of interaction in their common planning periods each week, where they can work on current issues and develop new ideas and resources to continue to improve the quality of their students' learning. Students feel supported by their teachers, and admit to liking Algebra I because it has real-life meaning and significance. Semester grades show more students passing Algebra I, but currently the final exam scores do not show the same picture. Evanston continues to summarize their findings each year and set new goals in implementation or modifications to improve the quality of their comprehensive program as a yearly goal, as well as weekly or monthly goals that teachers set in their team meetings and professional learning communities.

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About *Practices Worthy of Attention: Local Innovations in Strengthening Secondary Mathematics*

Practices Worthy of Attention is a joint initiative of Achieve, Inc. (www.achieve.org), and the Charles A. Dana Center at The University of Texas at Austin (www.utdanacenter.org). The initiative is led by Pamela L. Paek, a research associate at the Dana Center, who, in 2006, examined 22 program, school, and district practices that showed promise—based on early evidence and observation—of strengthening secondary mathematics teaching and learning.

Our goal was to document practitioners' descriptions of *what is really happening* in the field to strengthen secondary mathematics education around the country. Thus, while the practice highlighted may be common, the specific structures and strategies used to implement the practice are worthy of attention. These initial investigations set out to mark these practices for future rigorous scientific inquiry by Dana Center and other researchers.

Ultimately, we hope to create a community of inquiry made up of university researchers working with administrators and teachers from featured schools and districts to more rigorously research how effectively these practices improve secondary mathematics learning for all students.

Reports and practice profiles. An executive summary details the methods for this initiative and analyzes themes. Two cross-case analyses discuss specific strategies for raising student achievement and building teacher capacity. Brief profiles describe each practice. All of these publications are available on our website at www.utdanacenter.org.

Data. In all cases, data about the practice were provided by the program, school, or district studied as part of a description of their practice. We did not independently analyze data gathered through a consistent assessment tool, and we did not evaluate their uses of data for measuring effectiveness. Thus, the data in the practice profiles are intended not to prove the practice's effectiveness from a research perspective, but to paint a detailed picture of the practice and what data were used by the program, school, or district to gauge how well it was working.

Theoretical frameworks. In some cases, district staff mentioned specific literature on theory or practice that they used when they developed the practice we highlight. In those cases, we cite that literature in our discussion of the practice.

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