

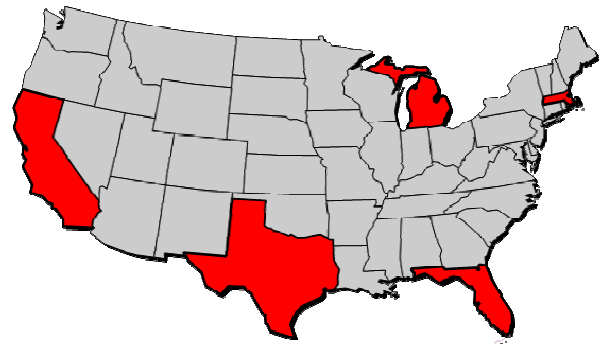


CASE STUDY

Core Practices in Math & Science: An Investigation of Consistently Higher Performing Schools in Five States

Roosevelt High School

North East Independent
School District
(Texas)



Introduction

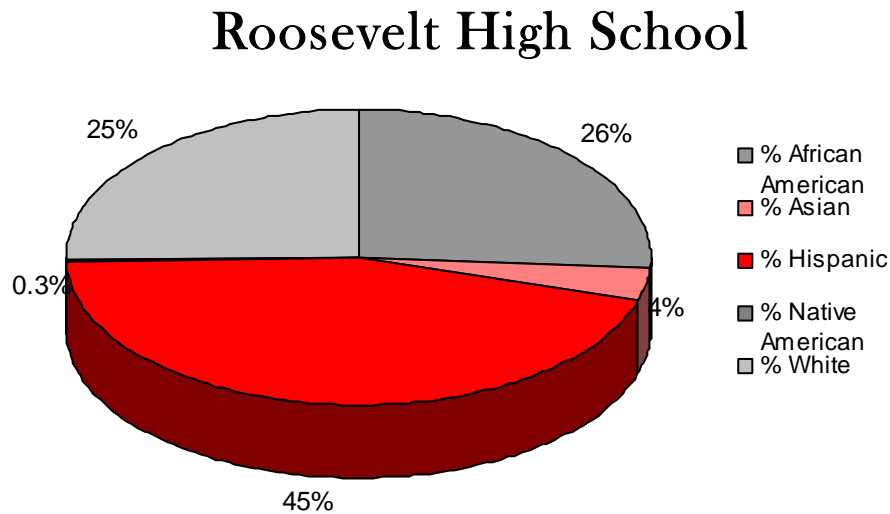
Since 1999, the National Center for Educational Achievement (NCEA) and its affiliated research teams have studied over 500 public schools across the country in an effort to identify and disseminate effective practices embraced by higher performing schools that distinguish their campuses from their average-performing peers. Building on the foundation established by this previous research, NCEA sought in the current study to focus specifically on educational practices in the areas of mathematics and science in five states: California, Florida, Massachusetts, Michigan, and Texas.

Criteria used in school selection in the current study included three years of state assessment data in mathematics and science (2004, 2005, and 2006), campus demographic make-up, percentage of economically disadvantaged students, school size, and geographic location. In addition, all of the schools selected for participation met the state and federal requirements for Adequate Yearly Progress (AYP) in 2006. Schools categorized as higher performing based on the selection criteria were those “beating the odds” with consistently better student achievement over three years, when compared to peer campuses with a similar student population. Therefore, a list of the state’s highest performing schools may contain schools different from those selected for this study.¹

In order to illuminate the roles of different members in a school community, for each selected school, NCEA researchers interviewed district-level administrators, school administrators, and classroom teachers. To supplement the interview data, researchers collected pertinent documents, observed secondary level algebra classes, and invited participants to take part in the NCEA *Self-Assessment* online.

¹ For more detailed information about the school identification process and the list of higher performing schools included in the study, please see the full cross-case report at <http://www.nc4ea.org>.

Figure 1: Student Demographics



District and School Profile

With an enrollment of 62,000 students, the North East Independent School District (ISD) operates a total of 70 campuses, including 42 elementary schools, 13 middle schools, and 7 high schools. The district's students come from the city of San Antonio, Texas, and several neighboring communities. Approximately 40% of the students qualify for free and reduced-price lunch. Just less than half (47%) of the students are Hispanic, with White students accounting for the second largest student group, at 40%. African-American students and Asian students account for 9% and 4% of students, respectively.

Roosevelt High School enrolls approximately 2,400 students, 54% of whom are eligible for free and reduced-price meals. Approximately 3% of the students are English language learners. Nearly half of the student population (45%) is Hispanic and 26% are African-American. Roosevelt High School houses two magnet programs: the Design and Technology Academy and the Engineering and Technology Academy.

As a strong proponent of higher standards, NCEA recognizes school efforts to move more students to the state's higher standard of achievement by accounting for those students in the analysis of consistent higher performance. Tables 1 and 2 summarize performance at both the state's proficient and advanced standards attained by the students at Roosevelt High for the years of 2004, 2005, and 2006. The state averages included in the tables represent student performance among schools with a student population similar to Roosevelt High, particularly based on the percentage of economically disadvantaged students.

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Table 1: Performance Trends based on Proficiency Standard

Grade	2004			2005			2006		
	9	10	11	9	10	11	9	10	11
Mathematics	52%	54%	69%	55%	57%	67%	69%	66%	88%
Science	Not Tested	60%	71%	Not Tested	59%	76%	Not Tested	69%	90%
State Average for Similar Schools (Math)	39%	39%	55%	46%	48%	63%	45%	51%	70%
State Average for Similar Schools (Science)	Not Tested	37%	50%	Not Tested	42%	61%	Not Tested	48%	65%

Table 2: Performance Trends based on Advanced Standard

Grade	2004			2005			2006		
	9	10	11	9	10	11	9	10	11
Mathematics	24%	26%	25%	23%	26%	27%	33%	32%	37%
Science	Not Tested	18%	16%	Not Tested	18%	18%	Not Tested	17%	21%
State Average for Similar Schools (Math)	15%	14%	15%	17%	19%	18%	16%	21%	21%
State Average for Similar Schools (Science)	Not Tested	5%	5%	Not Tested	7%	7%	Not Tested	9%	10%

Theme 1

Student Learning: Expectations & Goals

The district curriculum is aligned with the state standards and state assessments. The district provides clarifying curricular resources online to help teachers align their teaching with these state expectations.

- The district bases the development of its curriculum on the state standards, the Texas Essential Knowledge and Skills (TEKS), but the district goes

beyond just the standards. District leaders additionally connect the state standards to how the Texas Assessment of Knowledge and Skills (TAKS) tests knowledge of the standards, and they align instructional resources accordingly.

- The district curriculum includes clarifying statements for the state standards in each subject area. These clarifying statements specifically outline what students should know by the time they finish that unit of study. District leaders also work closely with deans and classroom teachers to develop detailed scope and sequence guides that flesh out the curriculum, including guiding questions, resources, suggested sequence, and assessment data.
- The district's approach to curriculum relies heavily on Dr. Fenwick English's research concerning the need to align "the written, tested, and taught" curricula. In North East ISD, the written curriculum is the state standards, the TEKS (made more useful by the clarifying statements); and TAKS makes up the tested curriculum. Those two elements are constant. The element that does change is the *taught* curriculum, which is the part the teacher controls in the classroom. As one district administrator noted, "As long as the teacher's taught portion of [the curriculum] is in line with the standards and how [they are] going to be assessed, then there's no room for failure."

The curriculum development and revision process includes multiple stakeholders at the district and school levels. Revision of the district's curriculum is ongoing.

- Leaders develop the curriculum as part of an integrated focus throughout the district. Specifically, the school improvement department develops and revises the district curriculum by working closely with members of the special education department, the education technologies department, curriculum compliance (including bilingual and gifted education), and teachers.
- During the summer, a team of educators revises certain aspects of the curriculum. The team is representative of the district demographics (e.g., large/small schools and grade levels) and consists of teachers, a content specialist, and an Assistant Director (a district-level administrator overseeing a particular subject). The team considers which elements of the curriculum need revision: they study the TEKS and supplement them as needed for clarity and alignment. One or two schools then pilot the newly revised curriculum. Based on the feedback from those schools, the district modifies the curriculum as necessary. This practice ensures ongoing curricular revision. As one district administrator explained, "The curriculum is a fluid document. It is never a final document."

With an emphasis on rigor in early grades and clarified roles for each grade/subject in the learning continuum, district leaders and working teams of teachers ensure vertical alignment within the curriculum.

- In science, district-established vertical team meetings include educators from each level within the district (i.e., kindergarten through physics). During these meetings, attendees review clarifying statements grade by grade to ensure vertical alignment in content and common understanding of expectations.
- Historically, district leaders have held vertical team meetings in mathematics for each high school attendance area about four times per year. These teams consist of one 7th-grade teacher and one 8th-grade teacher from each feeder middle school, as well as one teacher each of Algebra I, geometry, Algebra II and pre-calculus from the high school. The purpose of these vertical team meetings is to foster team learning through professional development activities such as reading articles and books and working mathematics problems together. The teachers discuss the end targets of the problems to see how their grade level and/or content areas contribute to students' mastery of the skill. Based on a district-wide emphasis on advanced placement (AP) strategy training, the vertical teams also pull Advanced Placement problems for vertical review.
- Recognizing the importance of an early foundation in mathematics, district leaders strive to align the math curriculum in kindergarten, first, and second grades. As one district administrator stated, "Those grades play an important part in...students fully understanding math concepts. If it doesn't begin in K, 1 and 2, there are huge gaps in students' learning and understanding. In fact, much of the algebraic reasoning begins in kindergarten." Vertical team meetings at the district level consist of two representatives each from kindergarten through grade 2 at each school and an administrator from each campus. Similar meetings take place with groups of 3rd-grade/4th-grade and 4th-grade/5th-grade teachers as well.

Theme 2

Staff Selection, Leadership, & Capacity Building

Schools' master schedules include common planning periods to allow teacher collaboration, eliminating teacher isolation and increasing consistency across classrooms and campuses.

- During common planning periods, teachers come together by course or by level to develop lesson plans and common assessments. They also discuss what is or is not working in their instruction, common problems they may be having with certain lessons, how to approach future lessons, and upcoming issues. They break down assessment data and develop a plan of action

based on the data. As one district administrator noted, “We have benefited so much from creating environments for teachers to have conversations. In these groups, [teachers] share knowledge about content, clarify what the standards are, share instructional strategies and practices.”

- The majority of interviewees agreed that common planning periods provide a much-needed opportunity for teachers to learn from one another. In addition to discussing the taught content, teachers also use collaborative time to share *how* they teach. The collegial time is especially helpful for new teachers. As one teacher explained, “We get feedback from one another, and this makes us more confident with new activities.”
- The special education department benefits from common planning periods, as well. Special education teachers at all levels meet with grade-level and subject-area teachers to discuss upcoming lessons and instructional strategies. General education teachers also benefit from the participation of special education teachers, because special education teachers contribute to lesson development. Common planning periods also provide an opportunity for special education teachers to determine how they will help their students connect to upcoming lessons. Such collaborative meetings are another way educators ensure that the curriculum reaches every student.

Professional development in the district is collaborative, practice oriented, and centered on student learning.

- The district’s professional development (PD) model focuses on small, campus-based group settings rather than on larger, district-wide groups. The PD model entails meeting with individual core teachers from campuses, sometimes two or three campuses combined. These groups focus on what they will teach in the next time frame, how the standards are written, what the expectations are, and how success in meeting those expectations will be assessed. Then they determine how to develop instruction that will lead to student success. As one district leader noted, “This has caused a lot more conversation to occur but also a lot of accountability within the teacher groups. They feel the accountability to do it because [the coursework consists of] lessons that they planned together. There is more ownership in it.”
- The district devotes much professional development to demonstrating how children learn and what it means to learn—not just, for example, math concepts, but anything in life. The idea is to have the children (as one district administrator noted) “get their hands dirty with it and truly understand the concept.” As she explained, it is about “getting the children to uncover math, not just covering it.”
- Many professional development sessions focus on best practices. Educators discuss content and the best ways to make that content comprehensible to

students. As one district administrator noted, “It’s not just to have a conversation about content but also to ask, ‘How do we know if the students are getting it?’ So there is an assessment piece. Then, if they are not getting it, asking, ‘What do we do? How do we respond?’” To help them answer those questions, special education department members and members of the educational technology department take part in these sessions. They go over exemplary lessons and discuss the questions that educators need to ask. Then they request that the teachers go back to the classroom, implement those lessons, and provide feedback.

District leaders provide multiple opportunities for teachers to develop an understanding of both the curriculum and content expectations for the students.

- Just before school starts each year, the district holds curriculum days for elementary and secondary schools. The goal of curriculum days is to summarize and discuss the expectations for the upcoming 9 weeks. During elementary curriculum days, the teachers meet with specialists, assistant directors, and coordinators in certain subject areas. During secondary curriculum days, the teachers meet with colleagues in their subject areas. Teachers typically meet before the beginning of each 9-week period throughout the school year.
- The district offers professional development opportunities for teachers to build their content knowledge. For example, the district recognizes, as Texas moves to the new “4x4” (4 years of both math and science) requirement, the district will need more Algebra teachers with expanded content knowledge. So they provide after-school trainings in Algebra I and II that provide extra assistance to teachers, especially new teachers needing extra support.

To support the district-wide focus on curricular accessibility for all students, teachers participate in professional development to learn about differentiated instruction.

- For 3 years, the school improvement department and the curriculum department have presented a summer differentiated instruction institute. They bring speakers in from around the nation to talk about different forms of differentiated instruction. As one school administrator explained, “We’re trying to develop more differentiated instruction strategies to meet the needs of our kids, to engage our kids, to make the mathematics relevant to them.”
- The special education department also sponsors training on differentiated instruction for those who work with children with severe disabilities as well as training on how to teach children with milder forms of autism, Asperger’s syndrome, ADHD, and other learning disabilities. Special education teachers also participate in all general education training. One district administrator

explained that it is very important for the special education teachers to attend training on the curriculum.

- The district provides basic modules on differentiated instruction that can be completed in a 1-hour faculty meeting. Leaders encourage teachers to bring in lessons that they are working on and consider what those lessons mean for all students^{3/4}at all ability levels. District and school leaders encourage teachers to think about the activities in the lessons, apply principles of differentiation, and then review the lesson from the viewpoint of actual students they teach.

Theme 3

Instructional Tools: Programs & Strategies

The process for selecting instructional programs in North East ISD involves a careful determination of effectiveness and alignment with the curriculum.

- Before selecting an instructional program for district-wide use, district leaders research programs extensively. District administrators may sometimes even visit campuses in other districts to see programs in action.
- The thorough review process takes into account both the alignment of the program with the curriculum and its alignment with the district's philosophy for the particular content area. District leaders ensure the program aligns comprehensively to the state standards. As one district administrator stated, "Almost every program that comes out claims to be standards-based, but there is a difference between putting the standards in the book and having the content of the book aligned with the standards." Once district educators research the program, instructional specialists review it to make sure that it is consistent with their philosophy and the vertical program in the district (i.e., appropriate for more than just one subject). After the specialists review the program, teachers and deans join the selection process.
- The district pilots all programs under consideration at one or two schools before purchasing them for the entire district. Ultimately, the decision to adopt an instructional program is contingent upon feedback from the teachers who pilot the program. The teachers determine whether a program is a useful tool for enhancing student understanding and increasing student achievement. As one district administrator said, "If it's not a tool that's going to make a difference with kids, then we don't buy it."

The district chooses instructional practices that both engage students and encourage them to demonstrate their understanding of concepts, not just regurgitate information.

- Teachers at Roosevelt reported that student group work often helps them develop a better idea of whether or not students know the material. During

group work, teachers ask students to describe how they solved a problem so students can both learn from their peers and extend their own knowledge about solving problems. Teachers reported that, in many cases, students explain things to each other more effectively than teachers can. In addition, teachers themselves learn from students explaining concepts to their peers.

- In science, labs and other hands-on activities help students learn challenging concepts. The district insists that teachers devote at least 40% of the class time to lab work. To that end, biology teachers collaborate to create lessons that include lab experience or hands-on components.
- As in science, math teachers incorporate active student learning activities. Math classrooms have stations at which students figure out hands-on problems and describe how they came to understand a concept. For example, at one of the stations, students have to calculate the circumference of a ball, given only a straight-edge ruler. As one district administrator explained, “Asking students to solve things in more than one way—and then asking them to communicate how they solved it—can extend their knowledge about solving problems.” The administrator also noted, “That practice also encourages the students to do the thinking rather than have them regurgitate what the teacher says. It requires the students to draw on their own knowledge and thinking and then expand upon that knowledge by gathering other ideas from fellow students.”
- School leaders reported that they emphasize getting the students to think about math and science in different ways. At Roosevelt, math and science teachers send vocabulary words to reading teachers. The reading teachers then incorporate those words into the reading activities. In math, every student maintains a reflective journal in which she explains, without using numbers, how she came up with answers to problems.

Theme 4

Monitoring: Compilation, Analysis, & Use of Data

District leaders in North East ISD emphasize the review and use of data to inform educational efforts. Regular, collaborative data analysis and improvement planning characterize the data-use culture.

- District administrators from all departments meet as a group to plan and discuss what is going on in the schools within the district. They explore the available data and look for relationships or certain variables that may exist. As one district administrator explained, “What we’ve tried to stress to people is that data does not answer questions. It simply reveals more questions to ask.” District leaders also understand that they must provide data to schools in a

variety of formats. For example, they try to use more visual representations like charts and graphs to illustrate certain findings.

- The district's three-step "data coaching" process encourages school leaders to study data as a group and draw inferences from the information. At the beginning of the year, school leaders review their data, create a presentation that analyzes the data, and discuss their campus plan to move forward. Each principal shares the presentation with his or her faculty at the beginning of the year. In October or November, faculty members review and analyze the data for each of their special education and ELL students. They then discuss the results and craft a plan for those students. During the spring, the faculty reflects on its members' practices to determine what is working, and the principal reports that information to the district leaders.

The district expects frequent monitoring of instruction and student learning. Educators supplement classroom-level assessments with a series of district benchmarks and optional school-level exams. Classroom walk-throughs provide administrators with informal assessments of both student learning and the level of instruction.

- At the district level, mandatory benchmark assessments are administered approximately three times per year in each of the core subjects. There are optional assessments that schools can give in addition to the required benchmarks.
- District leaders purchased a database of district-benchmark assessment questions, which they also make available to classroom teachers. These assessment questions have assigned levels so educators can be sure they are assessing students at the depth and complexity of the state test.
- Leaders ask classroom teachers to develop mini-assessments on a regular basis. Teachers re-teach when necessary, based on results from quizzes and tests they give their students.
- At Roosevelt, school leaders conduct a minimum of 70 classroom walkthroughs per week. District and school leaders consider the walkthroughs essential to monitoring both teacher and student performance. The walkthroughs provide administrators with a real-time view of what goes on in the classroom. They can gauge student engagement and whether a teacher might need to improve his or her instructional methods. As one school administrator explained, "We document the things we see, and everything is noted. We work very hard to provide a supportive atmosphere, not just evaluative...we are there to make better teachers."

Theme 5

Recognition, Intervention, & Adjustment

Roosevelt High School provides a number of intervention programs—both within and outside of the school day—for students needing additional help.

- The course schedule at Roosevelt High School provides several academic electives that educators can use for student intervention. Administrators incorporate these classes into student schedules whenever necessary. For example, although the school schedule uses an alternating block schedule, some sections of Algebra I meet every day. These sections, with no more than 20 students, are available for freshmen who failed the math TAKS in seventh or eighth grades. Additionally, the school offers “Applied Skills” classes to some students who have learning difficulties either in a particular area or overall. Some 90-minute Applied Skills classes include 30 minutes of math tutoring, 30 minutes of English tutoring, and 30 minutes of TAKS tutoring. Educators arrange other classes so some students, for example, take a math lab class along with Algebra I.
- Teachers try to intervene with students as early as possible. For example, Roosevelt offers a credit protection and recovery program that allows 9th-grade students who fail the first 9 weeks of study to take a 5-day crash course before and after school to bring their grade up to a 70. The students also may take the course at the end of the third 9-week period.
- Students may attend tutoring sessions every morning and most afternoons until 6:00 p.m. Some tutoring opportunities include motivational incentives. For example, students who attend tutoring can earn tickets for drawings featuring MP3 players and other prizes. In addition, college students come to the school every day after class and work with students on homework or on other issues with which the students might need assistance, and the college students offer pizza to those attending the sessions.

Summary of Findings

Student Learning: Expectations & Goals

Educators in North East ISD rely heavily on Fenwick English’s concept of the “written, taught, and tested” curriculum to describe their approach to student learning. The district aligns its curriculum with the state’s content standards (written) and assessment expectations (tested). Teams of district and school personnel create additional resources, such as clarifying statements and scope and sequence documents, to support teachers and ensure that the taught curriculum is aligned with the written and tested curricula. Vertical alignment of concepts and skills within the curriculum is equally important in the district, and

numerous structures help incorporate cross-grade coordination of expectations and instruction.

Staff Selection, Leadership, & Capacity Building

District leaders structure professional development in North East ISD to emphasize collaboration and practice-oriented opportunities. The master schedule at Roosevelt High School includes dedicated common planning periods that allow teachers of the same subject to study content standards, plan common lessons, and review student assessment data together. Professional development offerings prioritize the development of teachers' content knowledge and instructional practice, especially as they concern instruction differentiation.

Instructional Tools: Programs & Strategies

North East ISD's extensive review process—including a piloting phase—evaluates the effectiveness of instructional programs before district-wide adoption. District policy requires teachers to devote at least 40% of classroom time to lab work. At Roosevelt High School, instructors build hands-on lab activities into both science and mathematics classes. Teachers encourage students to actively engage in their learning through lab work and peer teaching.

Monitoring, Compilation, Analysis, & Use of Data

District leaders emphasize the regular analysis of and response to data, as well as engage principals and teachers in collaborative review of their data. District-wide benchmark assessments, along with school-based assessments, provide rich progress-monitoring data. Classroom walkthroughs give Roosevelt High School administrators regular insight into the level of instruction and student engagement in classrooms.

Recognition, Intervention, & Adjustment

At Roosevelt High School, early intervention is a priority when student learning needs emerge. Five-day "crash courses" help students who failed the first or third 9-week period to ensure they do not fall too far behind. The master schedule at Roosevelt provides opportunities for students to double up in mathematics and includes academic support classes for tutoring and intervention within the school day.



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