

The Dilemma of Excellence and Diversity

by Crystal Bonds, *The High School for Math, Science, and Engineering*

During my three years as a new principal at The High School for Math, Science, and Engineering (HSMSE), one of New York City's eight specialized high schools, I found myself constantly wrestling with two challenges: maintaining the school's high academic standards and protecting the school's extraordinary diversity. Among the city's eight specialized high schools, HSMSE usually ranks 4th or 5th in the cut scores needed for acceptance based on a standardized admission exam.

At the same time, according to The New York Times, HSMSE ranks first among all New York City high schools in the diversity of its student body. I see my overall mission as not only maintaining but even improving the school's academic excellence and also preserving our distinction for ethnic and racial diversity.

Academic Excellence

When I use the words "academic excellence," I don't merely refer to such usual measures as college acceptance rates, average SAT scores, and Advanced Placement courses (we are doing very well in all these areas) but rather the rich academic programs available to our students in the areas of math, science, and technology. Despite the school's small size (450 students) and in order to meet the diverse interests of our students, sophomores select one of three major concentration tracks: Advanced Engineering, Mount Sinai Biomedical Research, or

an accelerated mathematics strand.

Advanced Engineering Program

The Advanced Engineering Program offers students a continuation of the pre-engineering program offered in collaboration with Project Lead the Way. Juniors take courses in Digital Electronics and Principles of Engineering; seniors select from Innovation and Design, Networking, and Advanced Civil Engineering & Architecture. Beginning in the summer before junior year, our Engineering students have the opportunity to apply for a paid research internship at CCNY's Grove School of Engineering, and may continue through the school year.

Mount Sinai School of Medicine Biomedical Research Program

This program was designed and implemented in collaboration with scientists and physicians at the Mount Sinai School of Medicine. The two-

year program consists of advanced laboratory experiences and a research internship in one of the medical specialties such as cardiology, oncology, obstetrics and the autopsy suite. The first-year course is an introduction to the basic concepts and laboratory skills used in the field of DNA and hybridoma technology. During the second year, participants are placed individually in two clinical or laboratory internships at the Mount Sinai Medical Center.

These internships provide students with understanding, knowledge, and skills related to DNA and biotechnology, preparing them for college, graduate, and professional school. The program exposes the students to career possibilities in biotechnology and also allows them to explore other areas of interest. Students must also write a science research paper suitable for entering into regional and national competitions.

Mathematics Concentration

The Math Concentration at HSMSE provides excellent experience and opportunity for students who are interested in higher mathematics and computer science. Students explore the creative and less conventional areas of math that ordinary high school classes do not cover. Juniors take two college credit-bearing courses, Pre-Calculus and Calculus, as well as AP Statistics. They are expected to take the Principles of Engineering course as well. In 12th grade, most students will take AP Calculus BC and a full-year course entitled, "Advanced Topics," comprising Graph Theory, Number Theory, Game Theory, Problem Solving, and Maple programming, a full computer programming language designed for mathematical computation.

All students in this concentration are required to complete at least two semesters of Varsity Math Team. Furthermore, students have opportunities to go beyond this curriculum by participating in college courses, local and national math research fairs and competitions, independent research projects and robotics.

THE SCHOOL'S ACADEMIC CULTURE

Literacy at HSMSE

Long before the introduction of The Common Core State Standards, HSMSE emphasized the importance of reading texts across the curriculum, conducting research, and writing formal papers that meet the highest standards.

All freshmen enroll in an Introduction to Research course, in which they are introduced to theories and methodology of research across the disciplines. In the sophomore year, students conduct research in science; in the junior

year research is conducted in American history classes. All seniors are required to produce an argumentative research paper in an English Department course that is designed to prepare them for writing at the college level.

Teachers as Professionals

Another reason for the success of our school is the faculty's acceptance of high standards of teacher professionalism. Teachers don't just hold students to high academic standards, but also hold themselves to exacting standards. The teachers regularly reexamine their teaching methods, revise their lessons, and refine their curriculums. An excellent example of this constructive approach was the teaching staff's success in translating a bureaucratic Department of Education mandate into a tool that helps us better understand the needs of our students.

In 2007, the NYC Department of Education promoted the creation of Inquiry Teams in every school as a core component of its school improvement strategy. Each Inquiry Team was charged with becoming expert in using data to identify a change in instructional practice (2008, NYC DOE). Inquiry Teams were reorganized to focus on the areas of need based on each school's Progress Reports, high stakes testing and inherent concerns in the school identified by faculty. Faculty self-selected a team of choice and met weekly to look at data, address the concern and present findings. Through the Inquiry Teams, faculty worked collaboratively to review data (i.e. SAT or PSAT scores, prior Regents exams) to make informed decisions for students and the school.

The success of our school is not coincidental. In addition to its hardworking gifted students and a dedicated

staff, the school is guided by a clear philosophical perspective that is translated into daily practice. From its earliest days, the founders of the school recognized the need for a clear, unified curriculum. They understood that for any school to be successful there has to be a body of knowledge that the students learn and master in all the academic disciplines. Working collaboratively, the teachers and administrators produced a sequenced, knowledge-rich curriculum.

DIVERSITY AT HSMSE

Our student body, in addition to being gifted, is also highly diverse. In May 2012, The New York Times published a study entitled: "A Portrait of Segregation in New York City's Schools." The study asserted that: "schools across the country have been going through a process of de facto resegregation. In New York, efforts over the years to reduce the segregation of schools have had little effect." In contrast, HSMSE was identified as the most diverse school in New York City. According to the study's author: "The Mathematics, Science and Engineering High School at City College is the [city's] most diverse ... (130 Asians, 75 blacks, 99 Hispanics and 101 whites)."

(http://www.nytimes.com/interactive/2012/05/11/nyregion/segregation-in-new-york-city-public-schools.html?ref=education&_r=0)

When you walk through the hallways of HSMSE you can witness the fruit of our diversity. You are not likely to encounter students of similar ethnicity congregating.

Diversity seems to be a matter of fact for our students; they do not dwell on it; they simply live it. In its first twelve

years, the school did not encounter incidents of ethnic tensions.

Unfortunately, among the city's specialized high schools there has also been a trend that as schools become more academically successful they also become less diverse. Thus, I worry that we will now be seeing the beginning of this trend at HSMSE.

I chose to write this article because we cherish our diversity; it is an integral part of who we are. However, as the table below illustrates, we are seeing the beginning of a shift in the school's demographics.

Year	Asian	White	Black	Hispanic
2010-2011	32%	25%	19%	24%
2011-2012	37%	25%	16%	21%
2012-2013	35%	28%	14%	23%

Figure 1. Enrollment by ethnicity 2010-2013

Reaffirming Our Diversity

HSMSE has taken several major steps hoping to maintain the school's diversity. Responding to various concerns, each of these initiatives has proven successful in our mission toward maintaining diversity.

Discovery Program

Discovery is a program developed by New York City's Department of Education. Its aim is to give students who did not receive a score high enough for admission to one of the specialized high schools, a chance to participate in a summer program to qualify for a seat in one of the schools. Its original intent was to provide access to students of color.

"As stated in the State law, the Specialized High Schools may sponsor a Discovery Program to give disadvan-

taged students of demonstrated high potential an opportunity to participate in the Specialized High School Program. The Office of Student Enrollment will determine the Specialized High Schools sponsoring a Discovery Program. Students will be notified if they are eligible to apply." (NYC Department of Education, 2013-2014 Specialized High Schools Student Handbook).

To be eligible, the student must:

1) have scored below and close to the lowest qualifying score on the SHSAT; eligible scores will vary from year to year and will be based on seat availability;

2) be certified as disadvantaged by his/her middle school according to the following criteria:

a. Attend a Title I school and be from a family whose total income is documented as meeting federal income eligibility guidelines established for school food services by the NYS Department of Agriculture, effective July 1, 2013; or

b. Be receiving assistance from the Human Resources Administration; or

c. Be a member of a family whose income is documented as being equivalent to or below Department of Social Services standards; or

d. Be a foster child or ward of the state; or

e. Initially have entered the United States within the last four years and live in a home in which the language customarily spoken is not English; and

3) be recommended by his/her local school as having high potential for the Specialized High School Program.

Those students who are successful in meeting the demands of the summer program will be granted an offer to the school sponsoring the Discovery Program. Those students who are not successful will attend the school to which they had previously been assigned. (NYC Department of Education, 2013-2014 Specialized High Schools Student Handbook).

HSMSE has participated in the Discovery Program for the past four years. Depending on the number of students who accept an offer, we open as many seats as possible since we have encountered success with the students and realized that the program helps maintain our diversity.

The program runs the summer following the exam, prior to entering high school. We host the program at HSMSE and make it a comprehensive program for students. Classes are taught by HSMSE faculty, students receive mentors, tutoring, school and campus tours and they get to know the environment. We get to know students by name and by face.

Once enrolled in our HSMSE, we track the students' progress regularly and when necessary we provide additional support throughout their tenure at HSMSE. Our data suggests that our "Discovery" students do well: 98% of Discovery students come in at a level 3 or 4. They are all on track for graduation with their cohort.

Middle School Initiative

With great concern after reviewing the worrying trend that affect our diversity, I decided to launch my own initiative, in the Spring of 2014. I called it the STEM Middle School Initiative (MSI). The roll out consisted of several components. I held a guidance counselors breakfast for my district (we currently have only seven students

in the school's zip code that attends HSMSE). The breakfast was a way to bring colleagues together to showcase the school as well as to discuss the program and answer any questions or concerns. We conducted a parent workshop at HSMSE to explain the program and have parents understand the commitment level expected of all participants. Our lead math teacher and Assistant Principal visited local middle schools to generate more student interest. Emails were sent to Superintendents, Principals and Guidance Counselors in the area announcing the launch of the STEM MSI Program with an explanation of the program.

The program seeks to partner with schools in our surrounding area. Our goal is not only to introduce higher level content and prepare students for the Specialized High School Exam (SHSAT), but also to introduce students, specifically, to the STEM disciplines through a set of modules taught by our own faculty.

The program is designed to begin working with a select group of students in the sixth grade and continue the work through the eighth grade as they gain knowledge and are better prepared for the specialized high schools exam. Students attend the program twice a week, on Saturdays from 9:30 am -1:30 pm and on Tuesdays, from 4:00- 6:00 pm. On Saturday we also serve the students both breakfast and lunch.; In the Saturday session, our instructors lay foundation in both mathematics and ELA, filling the gaps. After providing this scaffolding, we plan on transitioning to more rigorous and intensive test prep sessions. On Tuesdays, through a set of modules, students are introduced to subjects in STEM through instruction and hands-on activity (i.e. robotics,

math research, engineering concepts). Additionally, teaching our STEM MSI students will go beyond the borders of the classroom; for example visiting THE New York State Structural Biology Center and the North River Waste Water Treatment Plant, both located very close to HSMSE.

The selection criteria include several components that go beyond scores on State exams. We look for the following: the students must attend a middle school in our school district or a neighboring one; be at the top 15% of students in the school and the top 10% in science and mathematics; a teacher recommendation; an essay, and standardized test scores of level 3 in math and level 3 in reading (due to the responses from school leaders indicating that the rubric for standardized exams have changed, we now accept students with a high level 2).

As part of our school's Service Learning Projects, we anticipate that HSMSE students will play an active role in the process serving as mentors and tutors during the sessions to receive community service credit. We have also partnered with middle school principals for our students to serve as tutors for students in their schools during after-school programs.

The middle school initiative is a blueprint in the making, striving towards equipping students with the tools they need to be academically successful and ultimately to pass the SHSAT.

THE DILEMMA

Maintaining diversity is very important to me. Nevertheless, as we prepare students for high school, the STEM fields, college, and beyond, I am reminded of the dilemma that students of color are underrepresented in the nation's top secondary schools,

colleges and universities.

There are many questions that still remain, which cannot necessarily be answered absolute, due to the number of variables that must be considered, but we should still ask and never stop seeking answers.

As I think about the "diversity" issue for our school, I am left with several questions:

- Should we focus our energies on prepping students of color for the admissions exam or preparing all students earlier?
- Why is the disproportionate number of students of color in top schools still happening?
- Will some students always be a victim of their neighborhood and/or circumstances?
- Is it that some students don't have the acumen or is it access?
- What can I do to make a difference?
- Where does this leave our school? Our city? Our nation?



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