

## The Real Thing: Career-Driven Education through Professional Technology

**Principal:** Randy Asher

**School Type:** High School

**Neighborhood:** Fort Greene, Brooklyn

**Title I:** Yes

**Total Enrollment:** 4662

**ELL:** 1

**Special Ed:** 19

**Web site:** [www.bths.edu](http://www.bths.edu)

Asian or Native Hawaiian/Pacific Islander:	57.4%
American Indian or Alaska Native	0.1%
White	21.0%
Black or African American:	13.1%
Hispanic or Latino:	8.0%

### Principal's Vision:

Industries and higher academia expect a certain level of expertise, and Brooklyn Tech's primary role is to facilitate the acquisition of aligned content knowledge and skills. The technology that students use in the classroom for their majors is also the technology they will use in their careers. High-end software and specialized machines are key parts of the school's post-secondary orientation. In a school as large as Brooklyn Tech, technology is more than an instructional necessity—it is also crucial for daily operations. According to Principal Asher, it eases burdens on students, teachers, and administrators in areas ranging from communication to assessment. Comprehensive data systems are particularly important to keep Tech running efficiently.

### Administrative Goals:

#### *Operational efficiency*

#### Data Analysis Systems

Well-run administrative practices are crucial in a school as large as Brooklyn Tech. The school is highly dependent on computer-based systems to store and track data. Principal Asher believes that school management should always be data-driven. This includes not only grades and test scores, but also running anecdotal records on each student, attendance, and text book inventories,

#### Datacation for Credit Accumulation Tracking

A data analysis system that allows analyses to be run on large groups of students is necessary for such a large school. Brooklyn Tech currently uses Datacation, a graduation tracking and credit accumulation/Regents proficiency package originally created by teachers at Telecommunications High School. It requires data feeds from HSST and ATS, but unlike these systems, it can be accessed outside

the administrative LAN, which prevents bandwidth issues at peak load. It has recently been enhanced to include additional functionality, but it is still not as comprehensive as a system like Daedalus (see below).

### **Daedalus for Comprehensive Student Profiles**

The school is in the process of moving to another system, called Daedalus, which was created by a former Assistant Principal at Stuyvesant. Daedalus is a more comprehensive suite than Datacation, and allows different access to different groups (teachers, administrators, guidance counselors, etc.). Student contact information, medical conditions, attendance records, schedules, and transcripts are all stored in Daedalus, along with ATS and HSST data. The system also has the capacity to store running anecdotal records on each student. For example, teachers can log in each phone call they make to a parent, or each letter they send home. Then, if parents say they are hearing something for the first time, teachers have records of all past communication. Daedalus even provides a space for Tech to log in textbooks that have and have not been returned. Guidance referrals can also be stored in Daedalus, as can “brag sheets” of achievements to be used in the college recommendation process. In short, Daedalus provides a comprehensive picture of each student. Tech has just begun training teachers in Daedalus this summer, so the school does not plan to eliminate Datacation any time soon.

### **Prosper for School-Based Assessment Data**

The school also uses Prosper software, which works in conjunction with a regular Scantron machine in order to analyze test results on paper Scantron sheets. Prosper allows tracking of answers to multiple choice tests question by question. It is therefore possible for teachers and administrators to know which students in which class chose “A” on a given question, which classes did well on a certain content area on a test, etc. The data can also be organized according to ethnicity and gender. Prosper data gives teachers quick feedback about their effectiveness in a given subject area, and provides them more information with which to differentiate teaching and learning. Teachers whose students performed highly can share advice or lesson plans with other teachers in their department whose students did not perform as well.

### **Naviance for College Planning**

Naviance is a guidance program used for college planning. With upwards of 4,500 students, many with numerous accomplishments, Brooklyn Tech needs Naviance to keep comprehensive records of each student’s activities and honors, so that filling out college applications is manageable. The software also tracks longitudinal data and can be used to provide guidance to students trying to narrow the list of schools to which they will apply.

## **Instructional Goals:**

### ***Preparation for College and Industry***

#### **Basic Foundations**

All students take Freshmen Technology, or Design and Drafting for Production (<http://www.bths.edu/tech/freshtech.jsp?rn=6750755>). As the syllabus indicates, the course is fairly advanced. Topics include: The Role of an Engineer, The Design Process, Product Design, Product Analysis and Improvement, and Designing as an Engineer. Students gain skills in technical drawing and modeling, as well as functional and structural analysis. For their various design projects and problems, they use Inventor, a 3-D software package from Autodesk. In Sophomore Technology

(<http://www.bths.edu/tech/sophotech.jsp?rn=6750755>), (also mandatory), students take Technical Drawing, as well as Woodworking and Machine Shop. These courses provide hands-on, project-based experiences in which students can produce physical prototypes of conceptual ideas. In their junior and senior years, students take technology courses specifically related to their majors (see below).

## Student Majors

In 10<sup>th</sup> grade, students at Brooklyn Tech are asked to select a major that will be the main focus of their high school education. The 16 choices are: Aerospace Engineering, Architectural Engineering, Biomedical Engineering, Biological Science, Chemistry, Civil Engineering, Computer Science, Electro-Mechanical Engineering, Environmental Science, Industrial Design, International Arts and Sciences, Law and Society, Media Communications, Mathematics, Social Science Research, and the four-year Gateway to Medicine program.

Students learn how technology relates to their field of interest and develop the technological skills necessary to work in these fields. For example, architectural and civil engineering majors learn to use software such as 3D Studio Viz and AutoCAD, and media and communications majors master Final Cut Pro and Flash. When they move on to college, they have already developed foundations in a given subject area. At Brooklyn Tech, technology is not used for technology's sake; it is key to subject knowledge.

## Project Lead the Way

The basic premise of the Project Lead the Way program ([www.pltw.org](http://www.pltw.org)) is that students take advanced courses in which they may earn college credit through the Rochester Institute of Technology in addition to their regular high school credits. The courses are similar to Advanced Placement courses except that students do not pay any exam fees, and only pay if they choose to accept the college credits (which RIT grants only to students who maintain an 85 course average and pass the formal university assessment). Courses take a problem-based learning approach, and Brooklyn Tech teachers are trained and certified by RIT. Principal Asher is currently negotiating for Tech, which runs the largest PLTW program in the nation, to become a training site for the greater New York metropolitan area.

## Industry-specific Labs for Specialized Majors

The students at Brooklyn Tech need resources for high-level, specialized study. Many of the majors have their own labs, and the computers have customized configurations including high-end processors to support memory-intensive software. What all of the labs have in common is that they are stocked with machines and professional software that the students will use in college and in the field. Principal Asher has also forged a partnership with a local university (NYU-POLY), which brought in a professor and NASA astronaut to teach a joint class of Tech students and college students. These sorts of opportunities would not be possible without Tech's sophisticated facilities, some of which exceed university-level instructional spaces.

Below are the major pieces of industry-specific software and hardware that students use in their courses:

- Architecture: Dells with Autodesk Suite including Autodesk Revit and 3D Viz
- Engineering/Project Lead the Way: Dells with Autodesk Inventor, Adobe Master Collection Suite
- Media: Dells and Macs with Adobe Master Collection Suite, Maya (part of Autodesk). Students use PCs to learn the basics, but move on to a Mac lab in their senior year. The industry typically uses Macs, which are more media intensive (audio, video, etc.)

- Physics/Biology/Chemistry/Earth Science: Most science classes are run in computer labs or Smartboard-furnished classrooms so students can gain a visual understanding of complex concepts. For example, biology students may practice on a dissection program before going into a traditional lab. Gateway to Medicine students have a dedicated lab of about 15 Macs equipped with science software.
- Computer Science: Students learn Java and HTML to prepare them for industry, as well as lesser-used codes to give them an understanding of the logic of basic programming. They learn to build a Web site from scratch, and majors have the opportunity to become A+ certified computer technicians.
- Aerospace Engineering: Students use Autodesk Inventor and X-Plane to design and simulate flight time for an aircraft. The course sequence culminates in the written portion of the FAA private pilot licensing examination.

### **Distance-Learning Partnership with Magnet School**

Brooklyn Tech has a distance-learning partnership with the North Carolina School of Science and Mathematics ([http://www.dlt.ncssm.edu/distance\\_learning/](http://www.dlt.ncssm.edu/distance_learning/)), which is a high performing magnet school. The partnership is in its initial planning stages, but will allow the schools to interact in real time and share high-level curriculum resources.

### **Industry Partnerships**

Tech was recently the site of a Clubhouse Parallel Universe conference. An IT executive at Bank of America teamed up with Intel engineers to teach a three-day workshop on parallel programming. 15 juniors and seniors at Brooklyn Tech learned the basics of parallel programming and engaged in a discussion about why it is important for Wall Street IT teams to move away from serial programming and toward this newer model. The workshop allowed students to hear from a leader in the field who believes there is a need for more parallel thinking on Wall Street—and that students should therefore be exposed to new, creative ways of problem-solving. Principal Asher would like to bring in more industry leaders and university professors to support the school's professional focus and prepare students for the future. "We're teaching kids to potentially go into a field that does not yet exist," he explained at the conference. But more importantly, "we're teaching them how to solve problems, no matter what they are."

As mentioned above, students can also take industry certification tests (computer science and aerospace).

### ***Technology as a Means of Improving Instructional Efficiency***

For majors and core classes that do not require labs, teachers use technology in the classroom simply to make their lives easier. For example, non-science teachers often use digital doc viewers. Doc viewers are connected to flashdrives with USB cables, and allow files to be converted into transparencies that can be used on a regular overhead projector (as opposed to an LCD projector, which works in conjunction with a laptop). Brooklyn Tech also has a number of Nova Desks, which have computers encased inside with pull-out keyboards. This setup allows a teacher to teach without the visual obstruction of computers, but also to incorporate computers into specific parts of a lesson. Using a program called Synchronize, a teacher can shut off Internet access with the touch of a button, as well as see what is on each student's screen (thus enabling better classroom management). Teachers can also organize their course material in one place through the Moodle, described below.

## Moodle Learning Management System

There are 40 courses available via Moodle, which is a Learning Management System accessible with a log-in through the school Web site. When students log in, they can access pages for their courses, which teachers populate with documents ranging from assignments, to course contracts, to grading rubrics, to vocabulary lists. Some teachers allow online work submission. The Moodle system was implemented in partnership with the New York Institute of Technology.

An example of a course available on the Moodle is World Literature. For a lesson about this year's Pulitzer Prize Winning drama, *Ruined*, (set during the war in the Congo), the teacher uploaded interdisciplinary content including *The New York Times* review of the play, a slide show of photos of the Congo, and history about conflicts in Africa. For Late American Literature, the teacher posted short stories as Word documents, so students could access their reading assignments online.

Not every teacher is required to have a Moodle page, and even those who have them are not required to use them. Freshman Technology teachers typically makes extensive use of the Moodle, while other teachers may use the Moodle for little more than posting a single Web resource; it is really up to the individual teacher. However, training is available to all teachers on how to create Moodle course pages (in fact, there is an online tutorial posted on the Moodle). Teachers can also use the Moodle to access quality lesson plans posted by their colleagues.

Administration	5
Departments	
Biology	3
Career & Technology Education	5
Freshman Technology	6
Sophomore Technology	
Chemistry	4
English	5
Freshman/Sophomore English	2
Health & Phys Ed	
Languages Other than English	3
Spanish	7
Italian	
Mathematics	
Calculus	2
Pre-Calculus	2
Physics	6
Physics Labs	
Social Studies	6
Majors	
Aerospace Engineering	7
Architectural Engineering	
Bio-Medical Science	2
Chemistry	1
Civil Engineering	3

Prior to the more widespread use of the Moodle, teachers used the student vault section of the Web site to post Microsoft documents, homework, hyperlinks, etc. They could also edit their course Web pages here. Most have moved over to Moodle, but it has been a 5+ year process. Now, about 60 percent of staff uses either the Web site or Moodle.

## Software to Individualize Student Homework Assignments

Physics teachers, as well as several chemistry teachers, have taken an interesting approach to homework assignments. They use the University of Texas at Austin automated online assignment

system, which allows them to generate individualized homework assignments for each student. The system assigns content specific questions but randomizes variables so that students cannot simply copy the answers from each other. Students are encouraged to work together in an online discussion group to talk about how to solve the problems. Because of the individualized assignments, when students assist each other, their collaboration is based on concepts rather than exact answers.

## Web site as a Communication Hub

The school Web site ([www.bths.edu](http://www.bths.edu)) was designed off-site through EdNetworks and was paid for by the PTA and the Brooklyn Tech Alumni Foundation. It is incredibly user-friendly and designed to provide all the information necessary for parents and students to stay informed of the school's schedule and events. Using the Web site, Brooklyn Tech is able to be very transparent with school data: progress reports, budget expenditures, etc. are all posted. Students can also access the Moodle and their e-mail accounts by logging in. Overall, the site is a convenient one-stop shop and an entry point to numerous external and internal resources.



Main page of comprehensive school Web site

## Course Materials and Homework

Students can sign up for automated homework notifications by logging into the school Web site. This feature sends e-mails to students reminding them of all assignments due within the next three days. All students and teachers have school e-mail addresses (@bths.edu) powered by Gmail to facilitate this process. Course materials and assignments posted on Moodle are also accessible through the Web site.

## Online Expression through Student-Run Newspaper

Another facet of the site is an online, student-run newspaper (<http://www.bthsnews.org/>) featuring student blogs, polls, and functionality allowing students to sign up for e-mail alerts in areas of interest. The newspaper was created by a student about 10 years ago, and students self-monitor and self-organize; the principal does not monitor the paper, which is considered to be independent (although he often posts

information as a means of communicating with a large number of students). Principal Asher trusts that students will hold themselves to a certain standard of appropriateness.

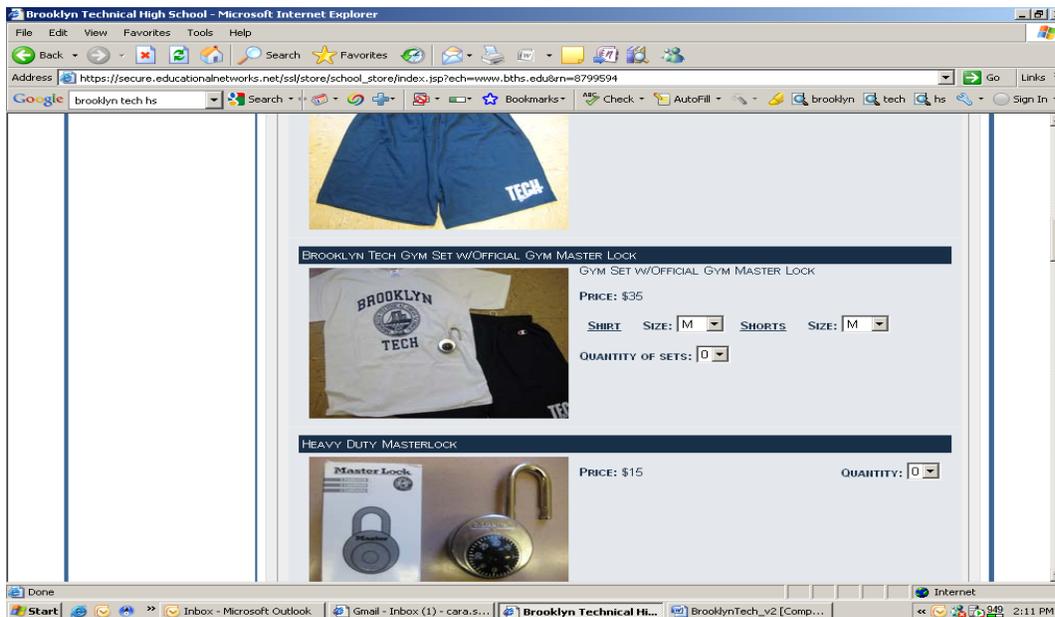
## Parent Engagement

Information for parents is posted on the main school Web site, and parents can sign up for personal log-ins to access additional information about their children, such as homework assignments. The site has a Google translator built in because over 60 percent of Tech students come from homes where English is not the main language spoken. Tech has a very active Parent Association, and its online presence is helpful in engaging parents who cannot attend meetings in person. Parents can also use the Web site to fill out emergency contact forms or pay their child's Advancement Placement Exam fees.

## Fundraising

The school's GO store, which sells items ranging from Brooklyn Tech apparel to flash drives, can be accessed online. A five percent fee is charged on credit card purchases via the Web hosting company, which provides an easy means for parents to make purchases without sending their children to school carrying cash.

The Alumni Association has its own Web site (<http://www.bthsalumni.org>), which is accessible through the main site. Described in greater detail below, the site allows alumni to get involved in fundraising activities and see the way their assistance (financial and otherwise) has helped make the school a model of 21<sup>st</sup>-century learning.



*Online school store*

## **Implementation of Technology:**

### ***Budgeting and Procurement***

The budget for Brooklyn Tech is \$25,000,000 per year. Although this keeps the school running, advances in technology occur through a large alumni endowment. A link to the highly active Brooklyn Tech Alumni Foundation on the school Web site provides information on their annual gala, a calendar of events, and videos available for alumni to stay updated on the school's growth. Often, Principal Asher submits proposals to the City Council and the SCA to acquire whatever he can, and then turns to the alumni to help integrate it into the school. Because alums aren't bound by contracts, they are often able to get better prices. Tech alumni are currently engaged in the 21/21 Campaign, which aims to raise \$21 million over five years in order to build the school for 21<sup>st</sup>-century learners.

Decisions about hardware and software procurement are usually made based on analysis of purpose and cost-benefit. The final decision about what new technologies to acquire is usually fiscal. In addition, all products acquired have a link to industry so that students learn applicable skills.

When Brooklyn Tech first opened its doors at the current location in 1932, the equipment was all state-of-the-art. However, much of that equipment remained in place until only several years ago, and the school was in need of updates. Over the past 3-4 years, one of the computer technicians says, the school has undergone a transformation. He stresses that networking and getting organized go a long way when it comes to budgeting for technology.

### ***Staffing Roles Related to Technology***

Brooklyn Tech has two full-time computer technicians (Level I and III computer certifications), a teacher who receives comp time three periods per day to take on technical responsibilities, two media technicians (who deal mainly with the auditorium sound and lighting), a data specialist, and a full-time Webmaster/online administrator. The tech staff is paid for with the school budget.

The Level III computer technician manages technical equipment under the supervision of the AP of Operations. Each departmental AP handles scheduling of equipment, but there are typically enough extra portable Smartboards and LCD projectors so that a teacher with a change of plans can request one of these machines from the Level III technician on short notice.

### ***Tech Support***

In addition to the staff members mentioned above, Brooklyn Tech has a group of students trained and led by the Level III technician, who perform tech support for service credit. During the year, these students (The Tech Squad) work during their lunch periods, and if they prove themselves, they may be hired and paid as student aides over the summer. Teachers can submit online automated work tickets by logging into the Web site's faculty page. Typically, the problems they report are basic enough to be resolved by The Tech Squad. This frees the computer technician to focus on more complex issues involving the server and network.

Anyone with an interest in technology can be a member of the Tech Squad. The computer technician highlights how empowering this experience can be by pointing out a student who he says is "one of his best assets." He initially caught the student writing code to hack into computers and his testimony

resulted in a suspension. When the student returned to school, the computer technician put him to work on the Tech Squad, where he has been using his skills for positive ends.

Principal Asher stresses that students often know more about technology than anyone else. In general, all students and teachers provide support based on personal proficiency.

### ***Change Management***

The hiring practice at Brooklyn Tech requires that incoming teachers accept technology as a critical component of student learning and work to incorporate it in the classroom. However, many of the teachers who have worked at Brooklyn Tech for decades are not as proficient as the newer faculty. Although they are not required to use tools such as the Moodle, there are aspects of their job for which technology is required. For example, teachers must submit grades online. They are provided with support, but online grade submission is not optional. Forms for teachers (such as surveys asking them which courses they want to teach the following year) are also posted online. Not every teacher has a computer in his or her classroom, but there are departmental computers they can use to fill out required forms.

### ***Professional Development***

There is an Instructional Technology Lab funded by a one million dollar alumni donation, dedicated solely to teacher tech training. There are frequent Moodle training sessions held here on the 35 machines. Teachers also use the computers for video editing, and language teachers have been experimenting with Rosetta Stone software in the lab. With the help of technology staff, many teachers have learned how to create videos of best practices and student presentations.

Technology also aids in ordinary PD. For example, if students from a given class perform consistently well in a certain area (which can be easily determined through the school's electronic data systems), that teacher may be paid per session to share his expertise during a common prep period.

### **Achievement Highlights:**

One of Brooklyn Tech's measures of success is their students' overall passage of AP tests. Below are highlights from their 2009 results.

Exam	Passing #
Art History	31
Biology	139
Calculus AB	226
Calculus BC	103
Chemistry	143
Chinese Language	38
Comparative Gov't	74
Computer Science	42
English Language	240
English Literature	172

Environmental Science	53
European History	50
French Language	8
Italian Language	15
Macro-Economics	104
Micro-Economics	74
Physics B	69
Physics C (E&M)	33
Physics C (MECH)	41
Psychology	89
Spanish Language	87
Spanish Literature	18
US Gov't & Politics	105
US History	288
World History	177

**Contact Information:**

You can reach Principal Randy Asher at [rasher@bths.edu](mailto:rasher@bths.edu), 718.804.6400.