

Technology At High Tech High



The Gary and Jerri-Ann Jacobs High Tech High opened in San Diego in September 2000 with 200 9th and 10th graders. In September 2001 the Upper School (11th and 12th) will open and the student body will expand to 300 students and will reach 400+ students in September 2002.

Despite its name and its impressive technology infrastructure, High Tech High (HTH) is not a technology high school. Instead it is a school that merges academic and technical (hands-on) learning. CEO/Principal Larry Rosenstock says “Technology is not studied as a subject; rather technology tools, both 2-D and 3-D, are ubiquitous and used for producing — that is, making, shaping, forming.” For Rosenstock, this is summed up in a common saying heard round the school: “You can play video games at High Tech High, but only if you make them here.”

At HTH, high tech means creative production in a technology-rich learning environment. Students use a variety of technology tools (computer, video, photography, lab equipment) to create useful products and to demonstrate their learning. The curriculum focuses on projects and independent work.

During the inaugural 2000-2001 year the school was divided into three student and teacher teams. In 2001-2002 the Lower School will have more content and direct instruction, the upper school more independent work and projects.

At HTH, “high tech” does not mean specialization in technology. Some students may specialize in computer programming or related fields, but most students will use technology to explore a variety of essential questions and issues in a variety of pursuits: scientific, mathematical, literary, historical, and artistic, and aesthetic. For example, a High Tech High student used computer scanning and digital manipulation to create works of art that challenge explicitly the notion that visual art requires years of student preparation and apprenticeship.

Technology use at HTH is constructive, not instructive. Students use technology as tools, but little use of Computer-Assisted Instruction (CAI) is made at this time. This is not totally a philosophical bias. Jared Wells, Director of Assessment, says that most CAI is not intelligent enough to play the effective diagnostic and tutorial role that can be better played by a trained human tutor. Wells is developing software that he believes will address this limitation.



Students use technology to do investigative research and create products in the form of word-processing and multimedia documents that they exhibit through web sites and Digital Portfolios. Teachers, students, and parents communicate face-to-face and by phone and email. Exhibitions, often using presentation technologies, provide a frequent and productive context for face-to-face communication and peer and community review of student work.

The presence of so much digital capacity raises issues about acceptable use. HTH has generated a student User Agreement, Computer Use Policy Addendum and Parent Permission Form for Internet and Electronic Mail (see below). Another important issue still to be addressed is the need for guidelines for content creation for multimedia documents and web sites.

Technology Infrastructure

The technology infrastructure at High Tech High is impressive. It starts with a top-of-the-line network foundation using very of the high-end ISP level Cisco equipment. All dishing critical servers use RAID hard drive configurations for high availability and redundancy. Presently HTH uses two leased T-1 lines for voice and one for data. An Intel 802.11b wireless network has also been installed for internal use, and fixed wireless is being explored for local loop and primary Internet access.

Computer equipment is also very high-end. There are 240 client computers, about half Intergraph Graphic workstations and half Dell workstations. In the animation lab the systems have very high-end Wildcat Video Graphics Card.

Presently we are exploring the use of Apple Macintosh systems for video editing and production. A more wide scale deployment in the future is possible depending on software availability.

Every seminar room (or classroom) at HTH is equipped with a suite of presentation technologies, including Smart Boards, an Audio-Visual cabinet, a video projector (1024x768), Computer, Cordless Microphone, and VCR. The computer itself acts as a low-cost DVD and CD player. For ease-of-use, electronic Smart Panels are used to facilitate audio and video source switching. These integrated units act as a remote control for the projector, computer, projection screen, VCR, and sound amplifier. They are mounted permanently in a convenient wall to give access and control of the A/V functionality to the presenter (be it a student or teacher).

Teachers all have access to Nextel cell phones to check out (In case of a field trip), and all have their own computers office cubicles.

Both students and teachers have ubiquitous access to exhibition technology in every seminar room and the Commons Room through Smart Boards, projectors, etc.

Students and Learning

Three structures provide a sense of place and identity to HTH students:



Workstation suites, where they have their own personal computer
Project Studios, where as part of a team they can plan and construct 3-D models
Construction Labs (BioCom Technology Lab, Computer Modeling Lab, and the Engineering Lab)

In addition, the student's Digital Portfolio provides a structure for the collection and public exhibition of student work over the student's four years. The Digital Portfolio includes a personalized learning plan, a current and future resume, graphic and narrative work samples of student projects and internships, a Spanish section (Mi Mundo), and links to a student's work on other web sites. <<http://plato.hightechhigh.org/students>>

The system for the Digital Portfolios is still evolving. Beginning in Fall of 2001, the first 3-5 days of each trimester focuses on student reflection of the last trimester and the updating of personal learning goals and the Digital Portfolio in general. Critical to the High Tech High design are rituals and processes for transitions (year-to-year, lower-to-Upper, graduation), including milestones and standards of performance for student work, and celebration. Starting in second trimester 2002, students will have to submit their Digital portfolios to Jared Wells for approval (informal quality control).

Students utilize a wide array of technology applications to do their work, including:

- Word processing (Microsoft Word and Office) to write papers and journals
- Email communication to consult experts and partners and to send work to their project teammates and their teachers (Microsoft Outlook w/ Exchange 2000 and Outlook Web Access)
- Internet for investigative research (screened via a Linux based content filtering engine)
- Multimedia tools to create online multimedia documents and web sites (Microsoft PowerPoint and Publisher, Dreamweaver and Flash by Macromedia, HTML, JavaScript, PHP, etc)
- Video tools including Digital Video Recorders, and a video-editing lab including the use of Apple Computer's Final Cut Pro, DVD Studio, iMovie, and iDVD
- Digital Photography using various Digital cameras and Adobe Photoshop.

In addition, students use specialized tools in seminars like Robotics and Engineering Design. In Robotics they use robotics kits (Basic Stamp Micro controllers by Parallax) that include controllers, servos, motors, photo-sensors, LEDs, etc. They program robots in Basic and C and communicate with experts and project partners by email. This year they developed as a class project called the Robotics Museum, which has posters, brochures and physical and virtual sites. Students are so thoroughly engaged in their work that "they never ask why do we have to learn this?" says teacher Ben Daley.

Teaching



In Spanish, Physics, and Math seminars they utilize, or are considering, specialized software or web-based learning resources. In Spanish there is an active use of Web-Based Spanish-language resources by students.

In Physics, teachers Ben Daley and Paul Millage use “Constructing Physics Understanding” (CPU), a Computer-Supported Learning Environment in which students take primary responsibility for developing a valid and robust knowledge about physics.
<<http://cpuproject.sdsu.edu> >

In Math, the Lower School curriculum uses a high-intensity personal tutor model developed by Jared Wells and is focused on core math literacy. The upper school curriculum will be more project-based. Wells is developing math tutorial software that will be intelligent enough to play the effective diagnostic and tutorial role that is now more effectively played by a trained human tutor. Wells says that in the future, HTH is considering using the Carnegie Learning Cognitive Tutor for Algebra 1, Geometry, and Algebra 2
<<http://www.carnegielearning.com/k12/mathematics/products>>

The Upper School curriculum is still being formed and may include symbolic Math Processors and modeling software (Mathematica, Theorist, etc.).

Also in development by Wells is an assessment system for scoring student projects by peers, teachers, parents, and community experts using online rubrics. Input would be via PDAs or hand-held computers. Reports would be available to students and parents by a secure web interface. Under consideration is the web-based scoring and grading program by Professor Mark Wilson at the Berkeley Evaluation & Assessment Research Center <<http://www-gse.berkeley.edu/research/BEAR>>

Administration

High Tech High uses PowerSchool, <<http://www.apple.com/education/powerschool>>, a comprehensive data management system for grades and projects, transcripts, progress reports, and attendance. PowerSchool is a web-based student information system that enables districts and schools to record, access, report and manage their student data and performance records in real-time. Parents, students, teachers and administrators use the system to share information about grades, attendance records, and homework assignments. Students can also select their own electives using the system towards the end of each trimester, greatly reducing the logistical complexities of student and room assignments.

Also in development for 2001-2002 is a web-based software package by the company LearningFramework. This software promises a secure, password-protected layer interface for teachers and students and for external visitors to learn about HTH.

2001-2002 Technology Infrastructure

Noteworthy Information Technology details:



A Secure FTP (SSH.com's sftp) server allows remote data access for teachers, administration and students. Using an SFTP server for remote access in lieu of a VPN infrastructure greatly reduces initial set up costs and ongoing maintenance.

Microsoft Exchange 2000 e-mail accounts for every user associated with High Tech High. This includes interested parents (parent council members, for example), all students, and all staff members.

Every teacher has their own state-of-the-art desktop machine. They can choose between an Apple MacOS X system or a Dell Dimension. HTH is also currently testing iPAQ Pocket PCs, pocket computers running on the Pocket PC OS, as an option for lower school students. We also planned on taking a serious look at the Tablet PC form factor once it is released.

Our main network infrastructure (disease besides the Cisco switches) includes Red Hat Linux servers configured as Gateway routers and Proxies. Our content filtering engine, based on the Dan's Guardian package ([DansGuardian - True Web Content Filtering for All](#)) is also open source and runs on a Red Hat Linux server.

Two MacOS X G4 servers run of the heart of our video editing and production infrastructure. In the future there are plans on allowing student access and manipulation to mySQL databases running on the G4 servers.

Personnel for Technology Support and Implementation

Currently HTH has a full-time Information Technology Director, Peter Estacio, who is responsible for network maintenance, voice and data systems, equipment support and maintenance, and training. Supporting the Information Technology Director is one full-time assistant system administrators who has primary responsibility for all Powerschool maintenance. Finally, we have one part-time computer repair specialist.

There is currently no Instructional Technology Coordinator at HTH to support teachers in identifying and implementing appropriate applications with their students. This may be needed, if only on a consultant basis, to accelerate effective application of technology for teaching and learning.

Bob Pearlman of HTH Learning is the author of this memo. It is based on interviews with Larry Rosenstock, Peter Estacio, Jared Wells, Ben Daley, David Stephen, Rodger Dohm, and Rob Riordan.

Updated 4/18/02 by Peter F. Estacio