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## UCSF Partnership to Enrich Science Teaching for Sixth Graders in San Francisco's Schools

### ABSTRACT

Increasing the diversity of students entering the health professions is a challenging goal for medical schools. One approach to this goal is to share the enthusiasm and energy of medical students with younger students, who may pursue medical education in the future. The MedTeach program, established in 1989 and coordinated by the Science & Health Education Partnership of the University of California, San Francisco (UCSF), does so by partnering volunteer medical students from UCSF with sixth-grade classes studying the human body. In 1997-98,

around 350 sixth-graders in the San Francisco Schools benefitted from the program. Each team of medical students visits its class ten to 12 times a year to present engaging, hands-on lessons on body systems and health. The medical students are also role models for the middle-school students. In addition, the diverse student population of San Francisco public schools provides a rich environment for the medical students to improve their communication and teaching skills.

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How would you teach a lesson about the skeletal system to a class of 30 12-year-olds, many of whom speak English as a second language? An engaging starting point might be a contest in which students whose elbows, wrists, or fingers have been restricted by splints are challenged to peel and eat a banana in one minute. All students, including those with limited English skills, immediately recognize the importance of joints and are eager to learn more. Where else might the lesson go? Articulated skeletons and joint models are excellent teaching tools, but a bag of chicken wings, gloves, and dissecting tools might provide the students with a more realistic idea of how their joints function. Using a light box and X-rays of normal and abnormal joints, students can learn to describe "what's wrong with this picture." Or explore orthopedics by

building joint models with popsicle sticks, rubber bands, and paper clips. Next time you can move on to the circulatory or respiratory system! Actively engaging adolescents in investigations of their own bodies is one way to spark their interest and motivation in science, which is critical for a future career in the health sciences.

### PROGRAM DESCRIPTION

The teaching ideas described above were borrowed from lessons taught by University of California, San Francisco (UCSF) medical students to sixth-graders in San Francisco through the MedTeach program. Coordinated by UCSF's Science & Health Education Partnership (SEP), MedTeach works by partnering teams of three to five first-year medical students with sixth-grade classrooms in San Francisco's public middle schools. Each MedTeach team visits its assigned class ten to 12 times over the course of an academic year, teaching lessons on human biology and health, topics that are the focus of the sixth-grade science curriculum. The medical students' presentations are closely aligned with the teachers' lesson plans, and the MedTeach teams receive advice and feedback on their lessons from their teacher partners and SEP staff.

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Now in its ninth year, MedTeach's popularity in the schools is demonstrated by the overwhelming number of teachers' requests for a team. Less than a fourth (ten out of 45 in 1997–98) of the teachers' requests for a team could be filled, even though more than a third (50 of 140) of the first-year medical students had volunteered for MedTeach. Teachers are selected for the program on the basis of need, with new teachers and underserved schools receiving top priority. In 1997–98, approximately 350 sixth-graders benefited from the program.

MedTeach incorporates goals for all participants, including middle-school students, teachers, and medical student volunteers. For the sixth-graders, MedTeach provides diverse, positive role models, who share important college and medical school experiences with the students. The sixth-graders interact with the medical students in small groups using hands-on materials and investigations related to important physiologic concepts. Such learning opportunities are critical to students' future interest and success in science, as recommended in the National Science Education Standards.<sup>1</sup> The teachers receive valuable classroom support, scientific and health knowledge, and opportunities to coach the medical students. For the medical students, the experience of educating a culturally diverse audience is invaluable, and the lessons they present reinforce their own learning.

Key features that contribute to the success of MedTeach include:

- The sustained relationship between one teacher, his or her students, and one MedTeach team
- The number of medical students per team (three to five), allowing more small-group work and individual attention to students
- A dedicated SEP coordinator responsible for lesson-plan design, implementation support, and feedback, as well as training volunteers and communicating with district teachers and schools
- Access to materials such as models, specimens, and medical equipment to enrich the lessons through the SEP's Resource Center
- Financial support from the School of Medicine (\$30 per team per year) and support of its students' volunteer activities

#### PARTNERS IN THE MEDTEACH PROGRAM

Three organizations work together to make MedTeach happen: SEP, the UCSF School of Medicine, and the San Francisco Unified School District. The short descriptions below help show the "ingredients" of MedTeach.

**The Science & Health Education Partnership:** Founded in 1987 by Dr. Bruce Alberts, UCSF professor and president

of the National Academy of Sciences, SEP has developed over the past decade into a network of programs with the common mission to support science and health education for all San Francisco students, using the human and material resources of UCSF. Several hundred UCSF volunteers participate in SEP's programs, for example, using the SEP Resource Center (a lending library of science and health materials), sponsoring science clubs, facilitating teacher workshops, or visiting classrooms, for a total of approximately 10,000 hours of volunteer activity annually.

**The School of Medicine:** The school of medicine has one of the most ethnically diverse student populations in the country. Of the 708 first- through fourth-year students in the 1997–98 school year, 49% are non-white: 21% represent traditionally underrepresented minority students (Native Americans, African Americans, and Latinos), and 28% represent students of Asian background. As a highly competitive public medical school, it draws students with impressive talents, experiences, and goals. Through MedTeach, some of this wealth is shared with San Francisco's public school teachers and students. In 1997–98, MedTeach involved 50 medical students distributed in ten teams. Given the demands on these students' time, the attrition rate over the course of the year is amazingly low, and in fact, the teams often recruit new volunteers during the year.

**The San Francisco Unified School District:** The 65,000 students enrolled in San Francisco's 110 K–12 schools represent a highly diverse population with respect to ethnicity, socioeconomic background, and native language. The major ethnic-group distribution of students is: 26% Chinese American, 20% Latino, 19% African American, 14% Caucasian, and 8% Filipino. Almost 30% have limited English-language proficiency, and more than half the students receive reduced-cost or free lunches. Many students are new to this country and lack information about university admission policies, academic requirements, and financial aid. The challenge of meeting the educational and social needs of this tremendously diverse student population is met by strong district leadership and ongoing support from community organizations and institutions such as UCSF.

#### MEDTEACH'S EFFECT

It is difficult to directly assess MedTeach's effect on students, but important to try to do so. SEP is developing evaluation tools to assess the program's effects on all participants, and in the future would like to tie MedTeach directly to teachers' professional development and medical students' training. Eventually, research on the academic performances and careers of students who have and have not been helped by MedTeach may provide indirect evidence of the program's effect. In this regard, in August 1998, the California state

legislature committed funds to the UC campuses for pre-college outreach and academic preparation, with the long-term goal of increasing the eligibility and enrollment of underrepresented minority students in UC's undergraduate and professional schools. In collaboration with the UC Office of the President and other UCSF programs, SEP will develop research instruments and surveys to evaluate the influence of MedTeach on middle-school students' academic choices, performances, and attitudes about science and health. While it is difficult to follow individual students over many years and to evaluate their academic achievements, these program-wide data may provide indirect evidence of the program's effect on the health professions pipeline.

Despite the lack of hard evidence at this time, the enthusiasm and great interest of all participants over the years, plus studies of the education process in the pre-high-school years, make clear that solid, early preparation in science and math such as MedTeach provides helps ensure students' future success in rigorous high school and college courses. A multitiered network of outreach and enrichment programs, including ones such as MedTeach, is essential to direct and maintain all students on a solid academic pathway that may lead to a career in the health professions.<sup>2</sup>

#### REPLICATING MEDTEACH

MedTeach has evolved over the years from a grant-funded project through which medical students received elective credit to a purely volunteer, non-externally-funded project. (SEP receives funds for core programs such as MedTeach from a variety of sources, including the UC Office of the President and the Howard Hughes Medical Institute.) Many variations could be equally successful. Here are some tips for getting started:

**1. Educate yourself about your local schools.** Contact individual teachers or principals directly or speak to the district science or health supervisors. Identify areas in which they need support, and clearly communicate your program goals and ideas. Work together to find an appropriate match in terms of grade level and topics.

**2. Develop a committed core of volunteers.** Communicate with student organizations, alumni, and health professions groups. Find out whether your medical school supports volunteer opportunities for its students and how those pro-

grams operate. Develop leaders within the core group who can sustain the program by recruiting and sharing past experiences.

**3. Seek out financial and material support.** Investigate various sources of support: small pots of money earmarked for community service programs, local pharmaceutical companies, or your local school district's health education program. Create a mechanism to obtain surplus supplies such as latex gloves, petri dishes, old models and equipment (and even human anatomic specimens). Request permission to borrow models and other teaching tools from university departments. Explore activity books to learn about innovative teaching methods: *Blood and Guts*, for example, is an excellent source of human physiology investigations for the middle grades.<sup>3</sup>

**4. Visit classrooms to interact with teachers and students.** Instead of preparing a formal presentation for your first visit, allow the students' questions and ideas to direct your discussion. Ask them what they've been studying and what questions they have. Visit different classrooms to determine what age-group would be a good match for your program.

#### CHALLENGES

Health professional schools and K-12 public school districts are similar in many ways: both are filled with committed, hard-working professionals who share the goal of creating a better-educated, healthier population. Yet the two cultures, and society's perceptions of them, are very different. Perhaps the most difficult but critical hurdle is to develop a collaborative partnership in which all participants have something to gain and something to give. Take the time to establish trust and open communication and begin to understand each other's cultures.

#### REFERENCES

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