A Gifted Teacher of Applied and Fundamental Physics

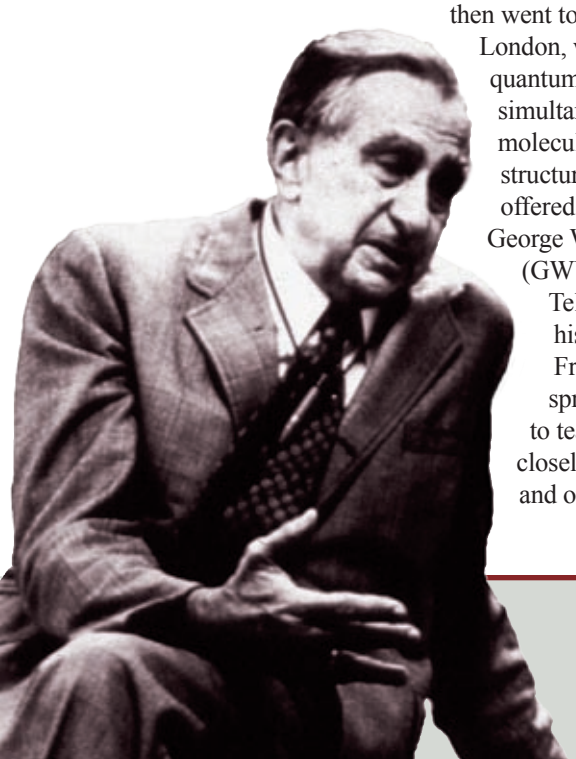
Highlights of Teller's Contributions to Education

January 15, 2008, marks the 100th anniversary of Edward Teller's birth. This highlight is the fourth in a series of 10 honoring his life and contributions to science.

HAD theoretical and applied physics not laid first claim to his talents, Edward Teller's gift for teaching would be his enduring legacy. No question from a student was too basic, no new idea too exotic to engage his interest and command a thoughtful response. Teller advised doctoral students in prewar Germany and later in the U.S., many of whom became leading scientists. He taught college physics for nonmajors and chatted about science with fourth graders. In each case, he capitalized on the opportunity to teach at a level his students could grasp.

On one point he was emphatic: Science and mathematics are systematic studies that can be taught appropriately to any age group. Teller argued that educators should teach current theories in ways appropriate to the students' level of learning well before such an approach was popular.

Certain in his vision for better science education, Teller complemented a passion for the classroom with research activities for more than three decades. As a refugee from Germany in 1934, he first worked with Niels Bohr at the Institute of Theoretical Physics in Copenhagen, where he was a Rockefeller Fellow. Teller then went to University College London, where he taught quantum mechanics while simultaneously researching molecular and solid-state structure. When he was offered a full professorship at George Washington University (GWU) in Washington, DC, Teller sailed as soon as his visa was in order. From fall 1935 through spring 1941, in addition to teaching, he worked closely with George Gamow and others, producing key results in theoretical physics. He also helped Gamow conduct a groundbreaking annual conference on theoretical physics. The discovery of fission was first announced at this meeting in 1939.



By summer 1941, the Manhattan Project was secretly under way at Columbia University, and Teller accepted an invitation to teach there even as he helped develop the first nuclear weapon. At Columbia and later at Los Alamos National Laboratory, he mentored students and younger colleagues on applied physics.

After World War II, Teller became a professor of physics at the University of Chicago. Several of his students went on to play leading roles in the heyday of postwar science. Among his students from Chicago were C. N. Yang (Nobel Prize 1957), Marshall Rosenbluth, Marvin Goldberger, Lincoln Wolfenstein, and Walter Selove. Earlier students at Columbia included Arthur Kantrowitz and Julius Ashkin, and at GWU, Charles Critchfield and Stephen Brunauer. During Teller's time at Berkeley, Balazs Rozsnyai, now a physicist at Lawrence Livermore, was one of his students.

With the 1952 founding of Lawrence Livermore as a peer to Los Alamos, Teller continued to teach at seminars and conferences. Simultaneously, at the University of California (UC) at Berkeley,

Edward Teller, who loved to teach, talks to rapt fourth graders from Lodi, California, in June 1990.

In the 1950s, Teller's Physics 10 class in Wheeler Auditorium at the University of California at Berkeley had almost 1,000 students. The basic physics course is still taught today.

he taught the basic course Physics 10, filling the cavernous Wheeler Auditorium for his class lectures.

In 1960, Teller proposed a Laboratory-linked educational institution that would make advanced scientific and engineering degrees accessible to working researchers. That proposal culminated in the creation of the UC Davis Department of Applied Science (DAS) in 1963. DAS was launched as a pioneering attempt to bridge the gap between new discoveries in basic science and the practical application of those discoveries.

That effort continues today. DAS draws faculty from the UC Davis Engineering Department and numerous Laboratory disciplines. Candidates for M.S. and Ph.D. degrees in engineering and multidisciplinary science apply through the Laboratory. Accepted students combine academic class work with applied science assignments on site. Teller nurtured DAS in its early years, chairing it through 1966. To date, more than 1,500 scientists have graduated from DAS.

In 1999, the Fannie and John Hertz Foundation gave $1 million to UC to endow a chair in Teller's name at DAS. Visibly moved by this investment in science education, Teller told the press that the honor meant more to him than any other he had received. "There's absolutely no award, there's nothing in the world that could be as valuable to me as a plan to better educate our next generation of applied scientists."

Two other contributions to ongoing education added to Teller's educational legacy. In 1975, he accepted an appointment as a Senior Research Fellow at the Hoover Institution on War, Revolution, and Peace. Located at Stanford University, the Hoover Institution provided Teller with a forum in one of the world's best-known think tanks and the opportunity to give an occasional lecture.

Concurrently, Livermore boosted its education outreach by instituting the Science and Technology Education Program (STEP) for science teachers. In March 2000, STEP and DAS began offering joint continuing scientific education for K–12 teachers, and exactly one year later, Teller endorsed the concept by lending his name. The Edward Teller Education Center (ETEC) was created to offer teacher-enrichment programs that align with the science content and teaching standards for California public schools. Laboratory scientists identify projects that integrate well with the state standards, and STEP administers the programs.

Edward Teller (wearing his trademark cowboy boots) throws out the first shovel of dirt at the groundbreaking of the Edward Teller Education Center. The center was formally dedicated September 9, 2003, the day coincidently also of Teller's death.

Perhaps Stan Hitomi, former ETEC director, said it best when he observed, "Dr. Teller never turned down an offer to meet and engage with students or teachers. He will always have a connection to education through ETEC and the Edward Teller Science and Technology Education Symposium."

—Alane L. Alchorn

Key Words: Department of Applied Science (DAS), Edward Teller Education Center (ETEC), George Gamow, Niels Bohr, Science and Technology Education Program (STEP).

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