
Los Alamos National Laboratory
Science Education Program

Progress Report
April 1 – June 30, 1997



Los Alamos
NATIONAL LABORATORY

**LOS ALAMOS NATIONAL LABORATORY
SCIENCE EDUCATION PROGRAM
PROGRESS REPORT**

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Los Alamos National Laboratory
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TABLE OF CONTENTS

TEACHER ENHANCEMENT

Teacher Opportunities to Promote Science (TOPS)	1
Regional Teacher Enhancement Program	2
Science 2000 Summer Institute for Teachers	2

STUDENT SUPPORT

New Mexico Supercomputing Challenge.....	4
Summer of Applied Geophysical Experience (SAGE).....	5
Critical Issues Forum (CIF).....	5
Summer Experience for the Economically Disadvantaged (SEED)	6
Historically Black Colleges and Universities (HBCU)	6
Mentored Collaborative Research With Resident University Teams.....	8
Atomic, Molecular, and Optical Physics Summer School (AMO)	9
Underrepresented Minority/Female Initiative.....	11
Undergraduate Research Semester (URS replaces SERS)	11
Regional Two-Year College Initiative	11
Beam Robotics Workshop.....	13
Faculty and Student Teams (FAST)	14
Science and Technology Alliance	14
Other Activities	14
Volcanoes And Human Affairs	15

EDUCATIONAL TECHNOLOGY

Teaching Hearing-Impaired Students to Speak	19
Education Networking Support (EduNets).....	23
Systems Modeling for Education.....	29
Equipment for Education	31

CURRICULUM IMPROVEMENT

Risks, Rewards, and Responsibilities Curriculum Development.....	32
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PUBLIC UNDERSTANDING OF SCIENCE

Practical Applications for Young Science Communicators (PAYS).....	33
Science Education Information On-line.....	33

LOS ALAMOS NATIONAL LABORATORY

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TEACHER ENHANCEMENT

Teacher Opportunities to Promote Science (TOPS)

Connie Witt, STB/SE

The final workshop for the FY96-97 TOPS cohort was held in Los Alamos on April 17-18, 1997. Final reports for the Student /Parent /Community (SPC) components and teacher professional portfolios were collected. Post program surveys were given.

Twenty-seven middle school teachers were accepted into the TOPS Program. The teachers represent 14 middle schools from 11 districts in Northern New Mexico. Teachers were selected to form cross-program vertical teams with participants in the elementary school level RTEP (Regional Teacher Enhancement Program) and the high-school-level Science 2000 Programs. The first workshop for the FY97 cohort was held in Los Alamos on May 16, 1997 in conjunction with the initial workshop for the RTEP and Science 2000 Programs. Teachers were introduced to the constructivist theory, presented with an overview of the national math and science standards, and given the pre-program survey. Participants were divided into regional teams to begin to identify other TOPS teachers as well as RTEP and Science 2000 participants in their wider educational communities.

The FY97 TOPS Summer Institute was held in Los Alamos on June 16-27, 1997 in conjunction with the RTEP and Science 2000 Institutes. The two-week institute was comprised of two three-credit classes offered through the graduate office of the Los Alamos campus of the University of New Mexico. The course topics were "Networking in Education" and "Introduction to Effective Instructional Strategies in Science, Math, and Technology." The networking course included an introduction to the computers presented to the teachers through the Department of Energy's GIFT Program, an overview of how to connect to the Internet and e-mail using the appropriate software, and an introduction to software to be used for developing models for networking within the educational community. The instructional strategies course presented an overview of models for instructional design and included an introduction to strategies, tactics, and tools such as cooperative learning, the constructivist approach to instruction, Socratic questioning, brain theory, learning styles, etc. Participants, within their vertical cross-program teams, were given the task of designing a set of lessons around a single concept that spanned elementary through high-school levels.

Regional Teacher Enhancement Program

Connie Witt, STB/SE

Twenty-six elementary teachers were accepted into the RTEP Program. The teachers represent 18 elementary schools from 11 districts in Northern New Mexico. Teachers were selected to form cross-program vertical teams with participants in the middle-school level TOPS (Teacher Opportunities to Promote Science) and the high school level Science 2000 Programs. The first workshop for the FY97 cohort was held in Los Alamos on May 16, 1997 in conjunction with the initial workshop for the TOPS and Science 2000 Programs. Teachers were introduced to constructivist theory, presented with an overview of the national math and science standards, and given the pre-program survey. Participants were divided into regional teams to begin to identify other RTEP teachers as well as TOPS and Science 2000 participants in their wider educational communities. The FY97 RTEP summer institute was held in Los Alamos on June 16-27, 1997 in conjunction with the TOPS and Science 2000 Institutes. The two-week institute was comprised of two three-credit classes offered through the graduate office of the Los Alamos campus of the University of New Mexico. The course topics were "Networking in Education" and "Introduction to Effective Instructional Strategies in Science, Math, and Technology." The networking course included an introduction to the computers presented to the teachers through the LANL Equipment Gift Program, an overview of how to connect to the Internet and e-mail using the appropriate software, and an introduction to software to be used for developing models for networking within the educational community. The instructional strategies course presented an overview of models for instructional design and included an introduction to strategies, tactics, and tools such as cooperative learning, the constructivist approach to instruction, Socratic questioning, brain theory, learning styles, etc. Participants, within their vertical cross-program teams, were given the task of designing a set of lessons around a single concept that spanned elementary through high school levels.

Science 2000 Summer Institute for Teachers

Bill Robertson, STB/SE

On May 16, thirteen teachers were involved in a workshop in conjunction with the TOPS and RTEP Programs. This workshop was held as a preview to the summer institute to be held at LANL in June, and included classes on constructivism, the National and State Standards, and technology.

The Summer Institute was held June 16-27 at LANL with 13 participating teachers from Santa Fe High School, St. Catherine's Indian School, Capital High School, Pojoaque High School, McCurdy High School, Pecos High School, Bloomfield High School, Newcomb High School, Cuba High School, Escalante High School, and Mesa Alta Junior High School. The Summer Institute was held in conjunction with the TOPS and RTEP Program, and a total of 65 teachers attended the institute. Teacher participants assembled into teams with representatives from the elementary, middle, and high school levels in order to develop curriculum units that could be delivered throughout the grade levels and centered around the topic of communications.

Participants attended instructional sessions on the use of concept maps, telecommunications software, computer hardware, systems modeling software, word

processing, and database software. Participants also received instruction on the use of the state and national science standards, and were involved in a two-day session on the integration of learning styles into the curriculum, led by Intellearn. Teams across the grade levels will develop a unit plan to integrate these topics as part of their curriculum during the coming school year.

As the final activity of the TEAM (Teacher Environmental Assessment and Modeling) Program, which was a predecessor of Science 2000, seven teams of students and teachers came to the Laboratory on May 2. They presented water quality models of the Rio Grande from their local areas, and the models were assembled using systems modeling software. Participating schools included Ignacio High School (Colorado), Hanks High School (Texas), Eagle Nest High School (Texas), Instituto Paso del Norte (Juarez, Mexico), Gadsden Middle School, St. Catherine's Indian School (Santa Fe), and Santa Fe High School. Scientists from the Advanced Supercomputing Lab gave a demonstration of the use of systems modeling in researching groundwater systems in New Mexico.

STUDENT SUPPORT

New Mexico Supercomputing Challenge

David Kratzer, CIC-6

The New Mexico High School Supercomputing Challenge Awards Days were scheduled April 30 - May 1, 1997. Trophies and ribbons were ordered and received, security guards hired, escorts and speakers drafted, hotel arrangements made, and food service coordinated. A new award was given this year to the "Best HTML Version of a Final Report" and four LANL employees were the judges for that award. Twenty-five other judges reviewed the 54 final reports submitted in hard copy and selected 13 teams to come to Los Alamos for final judging the day before the Awards Ceremony. During the two day event, Challenge participants were taken on tours of Los Alamos National Laboratory and saw the computers they have worked on and heard many talks and demonstrations. The tour groups went inside the fence under escort by Computing, Information, and Communications Division employees. Approximately 235 students and teachers came to the Laboratory for the activities.

Results of the Awards Ceremony were announced through the Laboratory's Public Affairs Office, the Los Alamos Dateline publication, several newspaper articles, a two-minute TV news spot, and the Challenge web page <http://mode.lanl.gov> (pictures are included).

The major awards given during the ceremony were returned to Technet for engraving and then presented to the recipients at Awards Ceremonies at their schools. LANL employees visited four schools in the northern part of the state; and Technet and UNM employees visited schools in the central and southern parts of the state. This gives us a chance to talk with school board members and parents to encourage future participation in and support of the Challenge. We received several compliments and thanks for our work providing the Challenge Program.

We continue to work on the 1997 Summer Teacher Training Session (STTS) having selected textbooks, purchased supplies, and mailed acceptance letters. This summer's STTS will be held at New Mexico Institute of Mining and Technology (NMIMT) in Socorro during the month of July. There will be two overlapping sessions of two weeks each. We have visited with our NMIMT contacts to confirm plans. Participants will receive a stipend, textbooks, room and board, along with graduate credit. A special logo has been designed for the STTS and will be used on binders, t-shirts, and on the STTS web page.

The introductory class (approximately 28 teachers) will study Unix, C++, the Internet, HTML, and have discussions to help them support future Challenge teams. The intermediate class (approximately 21 teachers) will study more advanced Unix, C++, HTML, and learn some Java, Perl, and CGI programming.

Discussions are ongoing with New Mexico Technet, Inc. which is the other major sponsor of the Challenge. They would like to reduce their costs related to the Challenge and their Challenge coordinator is retiring. This may have a significant effect on the future of the Challenge, but LANL is committed to continued support of the program.

Graham Booker, a third year Challenge participant, spoke to the University of California Board of Regents when they were in Los Alamos to get input for the selection of the next Laboratory Director. He encouraged them to select a director who would continue to support educational programs such as the Challenge.

The Challenge will have an informational booth at Computer Expo '97 in August in Albuquerque to solicit participation from schools that currently are not participating. The Expo is geared toward K-12 education this year.

Summer of Applied Geophysical Experience (SAGE)

Scott Baldrige, EES-1

SAGE, a field-based undergraduate- and graduate-level geophysics field course, is in progress at the time of this writing. This summer, SAGE includes 26 students from a wide spectrum of U. S. and foreign colleges and universities. Half of the students are either undergraduates currently, or have just graduated with Bachelor's degrees; the other half are enrolled in graduate programs in geophysics. SAGE 1996 also includes three of last year's students returning to conduct additional research and to help with field activities. SAGE is based at the College of Santa Fe in Santa Fe, New Mexico, which leases classroom and laboratory space and cafeteria facilities. All SAGE participants, including faculty and most visitors, are housed in dormitories at the College. Several companies have personnel participating in SAGE 1997, including Chevron, Mobil, Exxon, Zonge Engineering, and Kennecott Exploration Company. Industry scientists contribute their equipment and expertise, and many of them work in the field and laboratory with the SAGE students, helping to gather and interpret field data. Among the projects in which this year's SAGE students are participating is a geophysical characterization of a Manhattan-Project-era waste site at Los Alamos, and, in cooperation with the New Mexico State Engineer's office, a groundwater project near Santa Fe. Both projects will provide experience at "real" sites, and will yield valuable geophysical data relevant to important social problems.

Critical Issues Forum (CIF)

Rick Alexander, Bill Robertson, STB/SE

The final student event of the 1997 program was held at the J. Robert Oppenheimer Study Center on Friday, May 9 at Los Alamos National Laboratory. Eight teams representing high schools from across the state participated in the event which included Los Alamos High School, Sandia High School, Menaul High School, Rio Grande High School, Los Lunas High School, Alamogordo High School, Las Cruces High School and Santa Teresa High School. A total of 74 students and 10 teachers attended the event.

This year's Forum topic was the Laboratory's Global Nuclear Visions Project. Science Education partnered with scientists from the Nuclear Materials and Stockpile Management Division in developing content materials and classroom curriculum. Student presentations discussed aspects of this problem such as world overpopulation, future nonrenewable resources, benefits and drawbacks of nuclear energy, conflicting visions for the future of nuclear technology, and world environmental impacts from

“things nuclear.” Each team gave a 20-minute multimedia presentation on a specific topic followed by 10 minutes for questions and answers.

Planning is underway for the summer institute where 10 participating teachers from last year’s program will come to the Laboratory July 14-25 to develop curriculum for the coming year. Planning will include adapting the web-based model for a new distance learning initiative.

Summer Experience for the Economically Disadvantaged (SEED)

Dolores Jacobs, STB/SE

Project SEED, a 16-week program for eligible high school juniors and seniors, is underway. It began June 16 and runs throughout the summer. We have 13 participants in this year’s program. The students were placed with preceptors Laboratory-wide, and are working directly with research and experimentation. The students meet at the University of New Mexico–Los Alamos Branch every Thursday for a course designed to enhance their ability to research and develop a project. They will be participating in several tours at the Laboratory throughout the summer, and on August 8 the students will display their work at a poster session in the Bradbury Science Museum.

Historically Black Colleges and Universities (HBCU)

Pamela Bivens, STB/UP

- Program Development
 - Hampton University Visit, Hampton, Virginia (May 21, 1997). Six Hampton representatives met with Laboratory personnel to discuss collaborative initiatives with the physics, computation, and engineering divisions. This collaborative initiative will result in the exchange of faculty and scientists, and increase the number of students in the internship program. Visitors were Dr. Samuel White, Dr. Alphonso Smith, Dr. Johnnye Jones, Dr. Carolyn Morgan, Dr. Tabibi, Dr. Urasa, and Mr. Kirkland, the visit coordinator.
 - Eighteen HBCU Program students are participating this summer. Three students are funded under split costs between their group and DOE/DP. Four students are sponsored solely through the ORISE Program from Oak Ridge. Nine students are covered entirely under the DOE/DP/HBCU Program. Two are sponsored through the Fuel Cell Program with which they are interning. A "Student Profile" is provided later in the report.
- HBCU Women's College Initiatives
 - Bennett College, Greensboro, NC. A visit is scheduled this fall to discuss direct collaboration with Dr. Lea Williams and the Women-In-Science Program through the Women's Leadership Institute.

- Spelman College, Atlanta, GA. A visit is scheduled this Fall with Dr. Etta Falconer to develop collaborative efforts with their Women-In-Science Engineering (WISE) Program.
- HBCU Men's College Initiative
 - Morehouse College, Atlanta, GA. While Morehouse College has strong internship commitments with NASA, there are opportunities to recruit students from this College. A visit is scheduled this fall.
- Summer Guest Speaker Series

Joan P. Packenham, Ph.D., Geneticist from the National Institute for Environmental Health Sciences (NIEHS) in Research Triangle Park, N.C., presented her research on "Comparative Genomic Hybridization and Spectral Karyotyping: Novel Approaches in Detecting Genetic Alterations in Cancer." This presentation was very well attended by Laboratory employees and Postdocs with the Human Genome Center and summer students throughout the Laboratory. Dr. Packenham was introduced by Kareem Washington, HBCU Program graduate student, a Human Genetics major at Howard University. Bud Whaley was very instrumental in the success of Dr. Packenham's visit to Los Alamos National Laboratory.

- Media Initiatives. To further expose HBCUs to the merits of the HBCU Program at Los Alamos, media initiatives are underway. The following are being pursued.
 - Black Issues in Higher Education. A story is in the developmental stages which will highlight some of the students and their summer research.
 - LANL Publication(s). Five students have provided Steve Sandoval, PA, with their student profile and information about their summer research projects. This will not only be seen by Laboratory personnel, but will be sent to each students' campus to further inform the campus administrators and professors of internship and career opportunities.
 - Recruitment Video. We are working with CIC-9 to produce a three- to four-minute HBCU Program video. Four students volunteered to participate in this production which will be sent to campuses to assist with more effective recruitment efforts. This video will also serve to educate the HBCUs about the program and various research opportunities available to their students.
- Recruitment Activities
 - Professional Meetings/Conferences Attended
 - North Carolina Alliance for Minority Participation – A&T State University Greensboro, NC, April 11, 1997
 - Minority Engineering Program Advisory Council (MEPAC) – UNM Albuquerque, NM, April 25, 1997

- Campus Recruitment Visit – A&T State University, Greensboro, NC, April 7-13, 1997
- Speaking Engagement – The 2nd Annual NASA Awards Banquet at UNM, April 25, 1997. Presented viewgraphs introducing to the audience of professors, students, and parents information about internship and career opportunities at Los Alamos. Provided information on how to obtain internships and how to prepare for career opportunities and graduate education.
- HBCU Student Profile – Summer 1997

Graduate Students

Anthony Cochran	Physics	Southern University
Ruth Jones	Physics	Alabama A&M Univ.
Sonya McCall	Physics	Alabama A&M Univ.
Philip Nelson	Chem. Eng.	Howard University
Tommy Rockward	Physics	Southern University
Kareem Washington	Human Genetics	Howard University

Undergraduate Students

Shonna Crisden	Chemistry	Lincoln University
Orlando Culbertson	Chemistry	N.C. Central Univ.
Aisha Fields	Physics	Hampton University
Seneca Haywood	Computer Sci.	A & T State Univ.
Walter Hicks	Mech. Eng.	Albany State College
Timothy Hughes	Computer Sci.	Vanderbilt Univ.
Michelle Moore	Elec. Eng.	Hampton University
Selam Negatu	Chemistry	Southern University
NeShana Shaw	Physics	Southern University
Kellie Wade	Chemistry	Claflin College
Leah Warrington	Physics	Southern University
Kenneth Williams	Physics	Lincoln University

A few of these students have inquired about staying on beyond the summer. A number of the others have expressed an interest in returning next summer. They have not only expressed interest in returning, their mentors have inquired as well. This is an indication of how successful the University Program Office has been with recruitment and retention.

Mentored Collaborative Research With Resident University Teams

Abad Sandoval, STB/UP

- This program (MRCP) was piloted in the summer of FY96 and was designed to develop connections between universities and technologies that are important to the stockpile stewardship program. In MCRP, a multilevel team of students came to the Laboratory during the summer to work with research staff. The FY96 project brought four students together researching the mechanical and structural

properties of polycrystalline and single-crystal erbium oxides, materials that play an important role in stockpile stewardship. One of the students is a graduate student and has continued on the project for one year.

- The MCRP has three teams in place this summer. One is the continuation of the erbium oxide research project (one graduate student and two undergraduate students), and the two new teams are an advanced manufacturing research project (one faculty member, one graduate student and one undergraduate student) and a materials science research project (one faculty member and one undergraduate student).

Atomic, Molecular, and Optical Physics Summer School (AMO)

Lee Collins, T-4

The school functions as a joint collaboration between the Los Alamos National Laboratory (LANL) and the University of New Mexico (UNM). The LANL funding component comes from Defense Programs of the Department of Energy, through the local Science Education Program Office, while the UNM part comes from the National Science Foundation (NSF) as a Research Experience for Undergraduates (REU) site, through the Center for Graduate Studies. This mutual endeavor marks the longest scientific collaboration between the two organizations and provides great flexibility and depth to the program. As but one of many examples, the students receive three hours of UNM graduate credit for their work during the program. The school follows the UNM summer term from June 9 to August 1 and primarily focuses on the broad field of atomic, molecular, and optical physics (AMO).

This quarter has taken us from the final recruiting stages through the first half of the summer session, the most intense period of activity within the project. Out of over seventy applicants, we accepted 16 students from around the country and from various scholastic backgrounds, covering upper-level undergraduates and first-year graduate students. They represented thirteen different states and four foreign countries (Russia, Cyprus, Mexico, and Rumania) with all foreign nationals being enrolled in U. S. universities. The educational institutions represented also show broad scope: MIT, Georgia Tech, Bryn Mawr, Evergreen State, Northern Colorado, New Mexico, Eastern Oregon, Nebraska, Ursinus, Virginia Tech, Eastern New Mexico, Trinity, USC, Rice, and Amherst. We accepted the same number of men and women based on a high standard of scholastic achievement; the final class has 44% women – a ratio far above the national average for participation by women in scientific programs at this academic level. This marks the highest percentage yet for the school but in keeping with our past record. In fact, this record of a large female component has greatly aided in further recruitment of women participants. Several of the most talented women students have particularly selected us due to our past recruiting accomplishments. We also have two Hispanic participants. The class reflects our aim at great diversity in the students and their experiences, which we have found leads to a highly vibrant and inquisitive group.

As in the past, we have employed a dual track for the scholastic program of lectures and mentored research projects. We have our largest contingent of lecturers with participants from UNM and LANL as well as four invited guest speakers from Cornell, Nevada-Reno, Harvard, and the NSF. In addition, Prof. Fearn, a summer visitor from

Cal State-Fullerton to the LANL Atomic and Optical Physics group, is presenting a set of talks and mentoring. An evolving feature, built upon from last year, revolves around the large contingent of UNM main campus professors who have volunteered to journey north (100 miles) to present lectures. The titles include Bose-Einstein Condensates, Catalysis, Cosmological Matter, Chaos, Quantum Optics, Atom Interferometers, Quantum Computing and Information, Laser Cooling, Propagator Methods, Pueblo Astronomy, and Extra-Galactic Astronomy. Varying in length from one period to a mini-series, these lectures provide the students with a challenging introduction to the latest, hottest topics in AMO and related fields. Response from the students to the lectures so far has been overwhelmingly positive with good, varied, and lively question sessions.

We have also had our largest number of mentor volunteers, thirteen, covering a wide span of topics. The students perform research under the guidance of a LANL staff scientist for the full eight-week session of the school. This program complements the morning lectures by focusing on the research experience. We have four experimental projects in addition to our usual ones in AMO theory. We have expanded the bounds of these projects and pushed into related fields. For example, this summer two of our students have participated in more astronomy-oriented endeavors such as the ALEXIS satellite and large-scale modeling of galactic clusters. This expansion results naturally from the base of the REU in the UNM Department of Physics and Astronomy as well as the close relationship between the two disciplines. Other projects include quantum computing, ultrafast laser interactions with matter, quantum control of molecular processes, atom-ion collisions, transient molecular spectroscopy, X-ray diffraction imagery, strong-field interactions with clusters, molecular dynamics simulations of atomic and crystal structures, electron scattering, voltaic energy generation, particle penetration through solids, and plasma modeling. All projects to date appear to be making excellent progress with much enthusiasm shown by the students.

Several news items about previous participants deserve mention. Two of our students were awarded the prestigious Center Postdoctoral Fellowship from the Harvard-Smithsonian Institute for Theoretical Atomic and Molecular Physics (ITAMP), one of the premier AMO centers in the world. Only one such position is given each year with competition on the order of the Oppenheimer Fellowship at Los Alamos. Robin Cote ('92) has become the 1996 recipient and Bret Esry ('92), the 1997. Another of our students, Steven Carr, has been invited to present his research, growing out of his mentored school project, at an upcoming meeting of the American Association of Physics Teachers. A large percentage of our classes (better than 70%) go on to graduate school in the sciences.

The students are all housed in the same building, leading to better bonding and social contacts. We have already had a get-together for students, lecturers, and mentors. In addition, they have had a tour of the Los Alamos Neutron Scattering Facility (LANSCE) and a cultural excursion to Santa Fe. Other planned events include tours of the Advanced Computing Laboratory and the Santa Fe Institute as well as the traditional AMO Night at the Santa Fe Opera. This year's session appears off to a fast, enthusiastic start!

Underrepresented Minority/Female Initiative

Abad Sandoval, STB/UP

- Currently, there are seven GRA students on board. Five of the seven are on a 50/50 salary cost-share basis with their host technical organization and the URM/F Program.
- The UNM-LA URMF Program has 20 recently graduated high school seniors that are college bound attending the eight-week summer program.
- New Mexico State University has five students doing summer research projects. These students are students that have completed an associate degree from a community college and are in transition into a four-year school with an emphasis on a SMET-type degree.
- Twenty-four UGS students are at Los Alamos as part of the summer internship program. Eleven of the students are being cost-shared with their host technical organization and the URMF Program.

Undergraduate Research Semester (URS replaces SERS)

Dolores Jacobs, STB/SE

The Spring 1997 URS Program was completed with 20 students participating in the closing Poster Session at the Bradbury Science Museum. Approximately 12 of the 20 students remained with the Laboratory for summer or full-year appointments through the Undergraduate Student Program.

The Fall 1997 URS Program was initiated with a strong matching round that produced 25 students accepting URS positions. We had a particularly strong round one matching where we filled 19 positions. The incoming students are comprised of 11 females and 14 males; there are 7 graduating seniors, 4 seniors, 11 juniors, and 3 sophomores. Students will be working in 10 different divisions here at LANL. Student acceptance and arrival packets were mailed. The mentor packet is prepared. The fall calendar is in progress.

Regional Two-Year College Initiative

Abad Sandoval, STB/UP

Status

- Continue Working with the Northern New Mexico Rural Educators Network that piloted a six-month on-line classes-for-credit program, using the University On-line System. Eight school districts participated. They are now looking at exploring the NOVANET for on-line class instruction.

- Twenty-five UGS students are at LANL as part of the summer internship program. Seven of the students are being cost-shared with their host technical organization and the TYCI program. One graduate student has been an off-site student, teaching courses at the School of Education at New Mexico Highlands University, as well as developing curricula on technology. He is teaching four technology education classes and providing technical assistance to the regional two-year postsecondary institutions. He is also drafting a final proposal to the National Science Foundation for an Advanced Technology Education Grant that would impact Northern New Mexico two-year postsecondary institutions, if successful.
- Continue working with New Mexico State University (NMSU) and twelve two-year postsecondary institutions to develop a New Mexico advanced manufacturing technology consortium. Plans to create this consortium include establishing technology centers of excellence in New Mexico. A preliminary proposal has been drafted and is being review by participating institutions. Private sector companies (Intel, Philips, and Allied Signal) have been invited to discuss their participation in this initiative.
- Have been working with three of the Montana tribal colleges discussing the continuation of their reservation's groundwater contamination research projects. The student summer research will be done off-site at their respective reservations. We're also drafting a funding proposal to the Ted Turner Foundation that would support their water quality programs.
- Two students are participating at the Laboratory this summer as part of the Tribal College Initiative (TCI). DOE has provided some support to the TCI with regard to assisting them to develop science, mathematics, engineering and technology curricula that will impact K-14 education. Participating two-year tribal colleges are the Navajo Community College, Crownpoint Institute of Technology, and the Southwestern Indian Polytechnic Institute.
- The Navajo Community College is being supported for their Geographical Information System (GIS) summer program. They hope to incorporate the GIS program as part of their curriculum next year.

Beam Robotics Workshop

Paul Argo, NIS-1

The BEAM Robotics Workshop had a great third year. We had over 70 youth put together several hundred robotic "creatures", from wheeled rollers to flapping insects. The number of underrepresented groups involved in the construction increased, both gender and race. We are excited by the number of young women that are recognizing that they can have a career in robotics or electrical engineering. For the second year in a row, we held the workshop in a Los Alamos School Facility. Again we found this works well. We had a graded series of robotic kits for the participants to build, from simple solarollers and solarflappers to rather sophisticated walking robots. On the third day of the workshop we had competitions/demonstrations, in which robots built during the workshop were able to compare their efficiency and ability against other workshop robots.

The informal robotics group has held several workshops throughout Northern New Mexico, instigated by previous participation in the BEAM Workshops. Schools throughout the area are purchasing BEAM kits.

Faculty and Student Teams (FAST)

Dolores Jacobs, STB/SE

Three teams each consisting of a science professor, an education professor, and two students have arrived at the Laboratory over a staggered period of five weeks beginning in June. Two of the teams have met and begun communication on the educational components, mini-courses, and shared project experiences so far. The New Mexico Highlands University Team arrived first and is working in CST-18 on Bio-Remediation. The team from California State University at Hayward and the team from the University of California at Berkeley are working in CST-11 on a Magneto-Optical Trap. Their technical work is proceeding well.

Science and Technology Alliance

Abad Sandoval, STB/UP

The Science and Technology Alliance (S&TA) has been in existence since 1988 as a consortium of three of the DOE national laboratories and four predominately minority postsecondary entities. This consortium had been funded by the DOE Office of Energy Research. Because of drastic budget cuts the consortium is having to rethink its direction, as well its strategies for other funding sources. Three senior managers from the participating national laboratories have demonstrated their willingness and commitment to keep the S&TA intact with a new focus on direction. The direction being discussed will have a collaborative research emphasis. There was no funding in FY97, but the lead laboratory (Sandia National Laboratories) has been working closely with DOE in an attempt to secure some funding for FY98.

Other Activities

Abad Sandoval, STB/UP

- We have been actively involved in the planning and organization of the Hispanic Serving Institutions Consortium for Research in Engineering, Science, and Technology (HiCREST). An MOU was signed in Washington in November 1996. This consortium will involve six Hispanic Serving Institutions and seven of the DOE national laboratories with a focus on graduate-level research at the laboratories. It appears that DOE will announce the go ahead, with some funding later this summer. LANL will be collaborating in several of the research projects.
- We have been involved with the New Mexico Universities Research Collaborative initiative. This project will involve four UCRD grants to participating New Mexico universities that submit graduate-level research proposals that are in line with LANL's core competencies.

- We have been very involved on a state-wide committee that was established by legislation enacted during the 1996 New Mexico legislative session, to develop a strategic plan for public education in New Mexico.
- Evaluations Reports and Demographics - To date (FY97) the Science and Technology Base/University Programs (STB/UP) student and faculty participation has been 13% Anglo, 53% Hispanic, 17% Native American, and 17% African American, 80% were from New Mexico. Gender participation consists of 58% male and 42% female.

Volcanoes And Human Affairs

Grant Heiken, EES-1

First Summer Session, 1997

The class "Volcanoes and Human Affairs," taught during the first summer session, 1997 at UNM, appears to have been a success. There were 19 students this year, considerably less than the usual 32. The reason appears to be that the university did no announcements of any sort, other than the standard course catalog.

There was the usual mix; science teachers, non-majors needing a science elective, some geology majors, and those who said that "it just sounded interesting." There were no mid-course dropouts (over three times of teaching this course, I've only lost two). Of special interest were middle-school science teachers from the Ramah Navajo School and the Jicarilla Apache school. In both cases there are volcanic features near those schools.

Class projects came out well. The two best papers were on (1) integration of a history of volcanic activity in the Azores with recollections of grandparents and great grandparents who were immigrants from Sao Miguel, and (2) an analysis of why nations with severe disagreements or at war do not take advantage of the effects of a natural disaster on the enemy nation.

The general response to the course was very positive, even by those who earned only "C's."

Horton Newsom, UNM researcher, was teaching a course on planetology during the same summer session. If we teach these courses again in two years, we may link them which would provide more continuity for those science teachers learning more about volcanism on the Earth and other terrestrial planets.

The course outline is attached below:

VOLCANOES AND HUMAN AFFAIRS-SYLLABUS

First Summer Session, 1997

Monday, June 9 Introduction and Orientation

Lec: Mount St. Helens, Washington – the human experience of an eruption.

Exercise: Locating young volcanoes in New Mexico, using the maps provided and section in your syllabus from Wood and Kienle. (Readings for next class: Fisher, Heiken, and Hulen [FHH], 5-27 and 263-285).

Tuesday, June 10 Nevado del Ruiz, Pinatubo, and Rabaul; continued.

Discussion: Cultures, attitudes, and natural catastrophes. (Readings for next class: FHH, 30-40; Simkin and Siebert, 1984.)

Wednesday, June 11

Lec: Where are the volcanoes of the Earth?

Discussion: Study and discuss the World map of volcanoes and earthquakes (where do large cities and volcanoes overlap?) (Readings for next class: Review FHH, 30-40; Wright and Pierson, 10-13, 23-25; Banks et al. 51-75 [advanced])

Thursday, June 12

The generation and rise of magma and the prediction of volcanic eruptions.

Discussion: Ideas for classroom teaching to demonstrate magma rise. Class members to choose topics for class projects (Readings for next class:FHH, 64-86; Hekinian, 46-55; Edmond and Von Damm, 78-93; Moore, 1975 [advanced])

Friday, June 13

The Earth's most frequent but least-observed eruptions-under the sea.

Discussion: Volcanism, plate motions, and life along the deep rifts. (Readings for next three classes:FHH, 41-63; Sigurdsson and Carey; Francis, 158-214; Heiken, 199?; Heiken and Wohletz, 1991 [advanced].)

Monday, June 16

Lec: Explosive eruptions-processes, eruption types, volcanic landforms, and products (IAVCEI videotape) (lecture given by Ken Wohletz

Discussion: Design of simple classroom experiments and the use of the Erupt! computer program. (Readings for next class: FHH, 87-114, 115-132).

Tuesday, June 17

Lec: Explosive eruptions-continued (lecture given by Ken Wohletz

Discussion: Continue the use of the Erupt! program and have a general discussion of the magnitude and effects of explosive eruptions.

Wednesday, June 18

Lab: Pyroclastic Rocks (samples, SEM images, in thin section)

Short Lec: The use of pyroclastic rocks in daily life. (Readings for next class: FHH, 133-146 ; Francis, 127-157; Waters et al., 1989; Chester et al., 147-170 [advanced].)

Thursday, June 19

Lec: Basaltic (low-silica) lava flows

Discussion: How do lava flows advance great distances without chilling and coming to a halt? What controls their shape? Can they be stopped by man? (Readings for next class: Francis, 127-157; Chapter 5, Wohletz and Heiken [advanced])

Friday, June 20

Lec: Andesitic and rhyolitic lava flows and lava domes

Discussion: Why do these higher-silica magmas form lava flows and dome rather than erupting explosively? (Readings for next class: From text on lavas and their classifications: Francis, 127-157; For Saturday's field trip-Heiken et al., 1989)

Saturday, June 21

All day field trip to the Jemez Mountains volcanic field; leave loading dock of Northrup Hall at 7:30 a.m., return about 6:30 p.m.

Monday, June 23

Lab: Lavas

Discussion: Short and long field trips in New Mexico to look at lava flows (need the Geological Highway Map of New Mexico, which is available at many bookstores) (Readings for next class-FHH, 163-173; Alvarez and Asaro, 78-84; Courtillot, 85-92).

Tuesday, June 24

Mid-Term Examination (1 hour)

Second hour: Lecture and discussion of volcanic eruptions and their possible global effects on climate and life. (Readings for next class: Baldrige and Olsen, 1989, Baldrige et al., 1983 geologic map [advanced]; Wood and Kienle, 290-313; Heiken et al., 1990 [advanced]).

Wednesday, June 25

Lec: Volcanoes of New Mexico – rifts, calderas and associated volcanic activity.

Discussion: Using the Geologic Highway map of New Mexico, discuss why New Mexico's calderas are located where they are and their importance to our economy. Discuss the Baldrige geologic map and locate areas for student field trips. (Readings for the next class: FHH 231-244; Nolan, 1979, 293-338 [advanced])

Thursday, June 26

Lec: From ashes grow the vines – Volcanoes and agriculture

Discussion: Volcanoes, agricultural management and cultural heritage (Readings for the next class: FHH, 177-198 and 245-257, McCoy and Heiken, 1990; Vitaliano, 104-141.)

Friday, June 27

Lec: Volcanoes, mythology, religion and archeology

Discussion: Early perceptions of the underworld; the basis for some myths in natural disasters. (Readings for next class [Monday]: FHH, 199-229; general reading on diatremes--Cox)

Saturday, June 28

Half-day field trip to the Albuquerque and Isleta volcanoes. Depart Northrop Hall loading dock at 8:30, return at about 1 p.m.

Monday, June 30

Lec: Volcanoes, geothermal energy, and ore deposits

Discussion: Why study volcanoes if you are a prospector? (Readings for the next class: read again FHH, 163-173, Krakatau, 228-243, 396-418, 419-420.)

Tuesday, July 1

Lec: Volcanoes, the atmosphere, and climate change

Discussion: Can explosive eruptions trigger climate change? How to watch twilights after large volcanic eruptions. (Readings for the next class: Easton et al, 1990; Testudo and Easton, 1985, 1986, 1987a and b, 1989, 1990)

Wednesday, July 2

Lec: Volcanoes of the Solar System. Discussion of Pathfinder Mission.

Thursday, July 3

One hour final examination

One hour reviewing teaching materials available to you-video tapes, books, pamphlets, maps, and computer programs.

EDUCATIONAL TECHNOLOGY

Teaching Hearing-Impaired Students to Speak

George Papcun, CIC-3

Technical Progress - In prior work, we have concentrated on continuous sounds such as steady-state vowels like *êeeeö* and *ôaaaö*. We have now turned our attention to continuous speech, and especially to so-called *ôstopö* consonant sounds. In English, these are the sounds /p/, /t/, /k/, /b/, /d/, and /g/. Physically, these sounds are characterized by the fact that the vocal tract is momentarily occluded as part of their production. Acoustically, these sounds are characterized by rapid change, caused by the transition from a closed vocal tract to an open vocal tract or vice versa. Tracking the effects of the rapid acoustic change is difficult. Even more troublesome is the fact that during the moment of occlusion, no sound is produced. Therefore, at this point there is an extreme version of the many-to-one problem in the sense that the same acoustics (silence) can be caused by many different consonant sounds, i.e., any of the stop consonant sounds.

One approach to dealing with these issues is to try to reduce the dimensionality of the problem; i.e., instead of considering each point of the vocal tract as an independent measurement, to describe the ensemble of measurements as a set of factors. Our previous work demonstrated that we can treat the vocal tract as two factors for steady-state vowel sounds (Nix, et al, 1996). Now we are applying that type of analysis to continuous speech. Figure 1 shows a twelve-factor analysis for representing continuous speech that includes both vowel and consonant articulations. The open circles represent the mean articulatory configuration; the * and + symbols indicate the high and low contributions of each factor. The first four factors account for 92.1% of the variance in the articulatory data. This corresponds to a root-mean-squared error of 0.86 mm and sufficient accuracy to model the critical articulator for each speech sound. The first two factors correspond very closely to the tongue factors derived previously, with factor one corresponding to tongue raising and factor two corresponding to tongue fronting. The motion of the lower lip is distributed across the first three factors. This correlational structure was unexpected and is further evidence of the considerable degree of coordination of movement of the speech articulators. The movement of the upper lip was not measured for this set of subjects since it is so highly correlated with the motion of the lower lip. Factor four captures both alveolar closures (* for /t/ and /d/) and velar closures (+ for /g/ and /k/). Factors five and six reduce the maximum error on some frames but do not appear repeatable across subjects. A non-linear factorization may increase the variance captured by a four-dimensional representation, but this particular linear factorization is more accurate than was anticipated, suggesting, therefore, that nonlinear factorization may not be required. Figure 2 illustrates the four-factor representation of articulation for the German sentence "Das gewaltsame biegen der staebe ist zu vermeiden."

The next step in dealing with these issues is to devise methods of prediction that can take the many-to-one problem into account. Accordingly, we have devised a heteroscedastic model of neural network prediction (Nix, D. and A. Weigand, 1994).

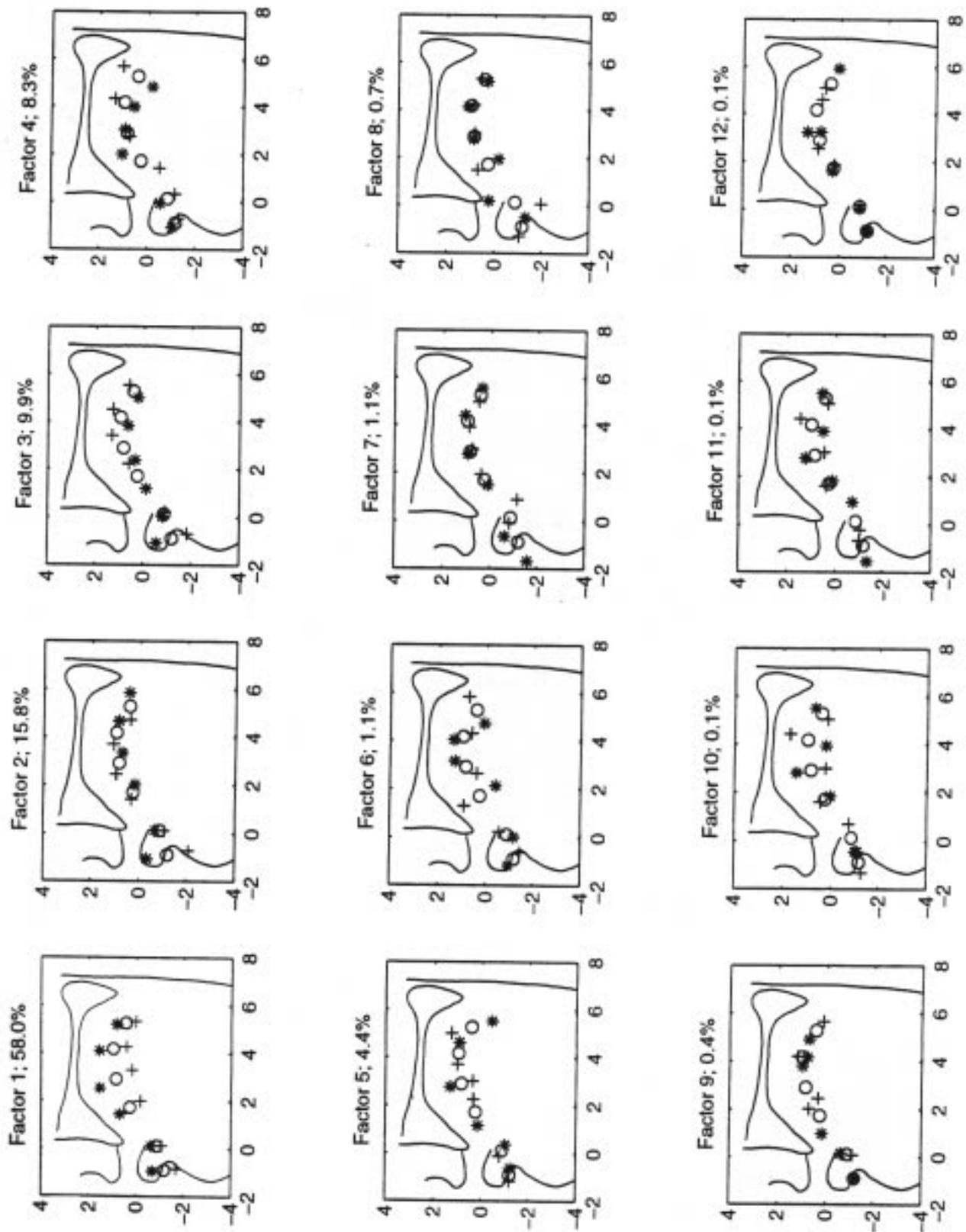


Fig. 1 Factors for Continuous Speech

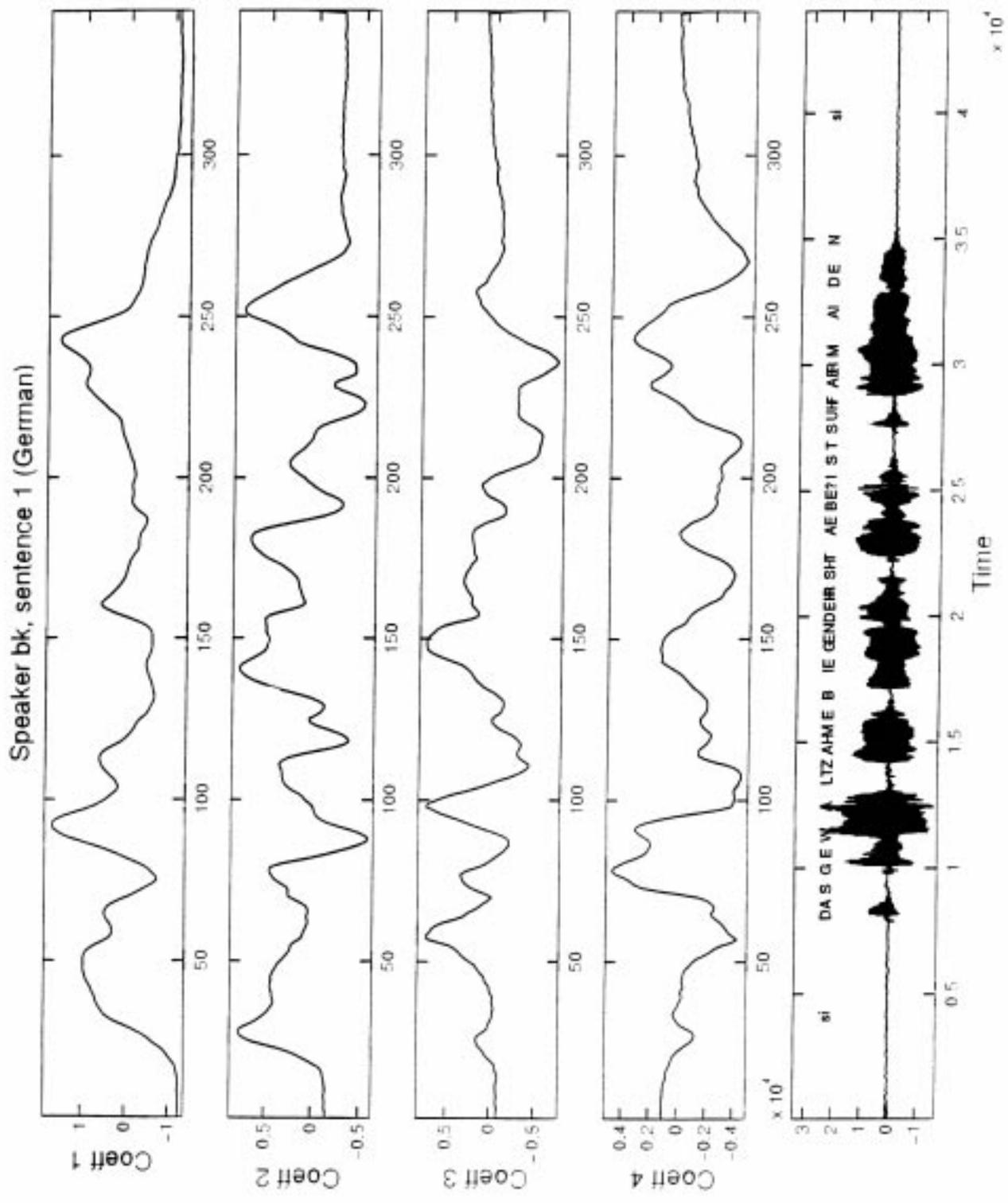


Fig. 2 Four-Factor Representation of Articulation

This model makes explicit the (un)certainty of its prediction. Thus, for example, during the steady-state sections of vowels, prediction of vocal tract configuration is likely to be highly certain. During rapid acoustic changes it is likely to be less so. During silence, it will have no information other than what can be inferred by its prior prediction. This model allows us to accumulate evidence as to the articulatory configuration in a manner similar to what we believe people do in listening.

Finally, we take into account our knowledge of the physical systems involved. The vocal tract, being a mechanical system, must trace a continuous path even when the acoustics are discontinuous, as at the occluded parts of stop consonants. We have devised prediction methods that take these constraints into account (Hogden, 1996).

Other Domains - The mathematical foundations we have derived for this project are proving their usefulness elsewhere; in particular, in detecting fraud for Medicare (see Hogden et al, 1997), and potentially in analyzing the results of nuclear explosions. In the latter case, the physical device corresponds to the vocal tract, which must have essentially continuous movement. The emissions, corresponding to the acoustics, may be discontinuous. Thus, there are deep analogies between the two phenomena, which permit the application of similar mathematical formulations.

Applications - Work is continuing with hearing-impaired students. Additionally, a Laboratory retiree who has had a stroke and consequent impairment of her ability to control her speech, has been using ADAM on an informal basis. She has shown dramatic improvement in her ability to produce sustained sounds of the kind that ADAM is good at. Of course, this makes us all the more anxious to incorporate additional sounds for her to practice with.

References

Hogden, J. "Improving on hidden Markov models: An articulatorily constrained, maximum likelihood approach to speech recognition and speech coding," LA-UR-96-3945, Los Alamos, NM: Los Alamos National Laboratory, 1996.

Hogden, J., J. Scovel, and J. White, "Anomaly analysis using maximum-likelihood continuity mapping," U.S.A. Provisional Patent Application for the University of California, pp. 1-20, 1997.

Nix, D.A. and A.S. Weigend "Learning Local Error Bars for Nonlinear Regression," Advances in Neural Information Processing Systems 7 (NIPS'94), edited by Tesauro, G., Touretzky, D.S., and Leen, T.K. MIT Press, Cambridge, MA, pp. 489--496.

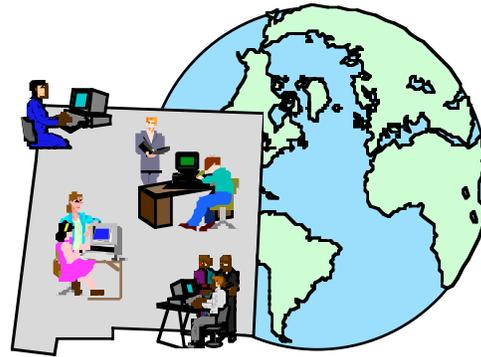
Nix, D. A., G. Papcun, J. Hogden, and I. Zlokarnik "Two cross-linguistic factors underlying tongue shapes for vowels," Journal of the Acoustical Society of America, 99 (6), 1996.

Education Networking Support (EduNets)

Pat Eker, CIC-6

Mission :

To Support the Efforts of Northern New Mexico School Districts and Educational Institutions to Establish Networking Infrastructures and Connect to the Worldwide Resources Available on the Internet ...



Project Description – The LANL Educational Networking Support Program (EduNets) was developed to support the national goal to have every school connected to an "information highway" by the year 2000. Our goal is to help school districts – schools, school classrooms, libraries, and offices – establish connections to Internet resources for science, math, engineering, and technology and to provide teachers, administrators, and technical teams training to use and support these resources. The project started with a pilot district in July 1994 and was established as a formal support program in October 1994.

The LANL EduNets program is designed to use Laboratory technical expertise and experience to help school districts plan and implement networking infrastructures for connecting their schools to the Internet and its resources. It is designed to provide a coordinated networking consulting resource for school districts in the program. It is also designed to establish partnerships with and provide support for community colleges, universities, and departments of education to help establish regional training and technical support centers to ensure continued future support.

Scope: Sites Provided Support

	K-12 EduNets Districts	Regional Training and Support "Hubs"	Total Districts, Hubs & Related Programs Sites	K-12 Schools in Program in NM School Districts	K-12 Sites Provided On-site Support
Oct 95	9	5	17	102	> 50
Oct 96	16	11	37	124	> 80
Jan 97	24	15	44	157	> 100
Jun 97	34	18	57	192	> 160

Current Support and Partnerships Scope – 34 School Districts (26 public and 8 non-public), 11 community colleges and universities, 12 other (3 departments of education, 3 regional technology centers, 2 support cooperatives, and 4 related LANL programs).

The current scope for direct assistance is primarily northern New Mexico public school districts, with some requested advisory and training support for non-public, BIA and other schools, in New Mexico and a few districts in other states. Direct Participant Level: Administrators, Teachers, Staff, Faculty. Indirect Participant Level: Students and Teachers in the districts that will be taught by the site's EduNets Internet support teams. Grade and faculty represented: K-14.

Regional Training and Support Centers – We added two regional support centers and partners this quarter - Western Oklahoma State College, Altus, Oklahoma, and Northern New Mexico Community College - El Rito Campus, El Rito, New Mexico. NNMCC-El Rito has previously been included for support as part of the NNMCC main campus in Española. We work with local community colleges and university sites to help them develop support and training centers and staff for their regions and to combine and coordinate efforts and networking support for the schools in their regions. We provide support for these sites and provide regional training, access, and resource servers for our school districts at most of the hub sites .

Support Centers – Hubs

	# Regional Hubs	Internet Connections	Regional Internet Labs
Sep 95	5	2 direct 56Kb	4 at 2 centers
Sep 96	13	5 direct T-1, 7 direct 56Kb, 1 dial-up (CIT)	19 at 8 centers
Jan 97	16	6 direct T-1, 8 direct 56Kb, 1 dial-up (CIT)	26 at 11 centers
Jun 97	19	9 direct T-1, 9 direct 56Kb, 1 dial-up (CIT)	32 at 14 centers

Current hubs and partners include: UNM-Gallup, Gallup, NM; Crownpoint Institute of Technology, Crownpoint, NM; Northern New Mexico Community College (NNMCC), Española, NM; Northern New Mexico Community College - El Rito (NNMCC-El Rito), El Rito, NM; Navajo Community College - Shiprock (NCC-Shiprock), Shiprock, NM; Navajo Community College - Tsaile (NCC-Tsaile), Tsaile, AZ.; UNM-Zuni, Zuni, NM.; the College of Santa Fe, Santa Fe, NM; Laredo Community College, Laredo, TX.; NM Highlands University, Las Vegas, NM; Western Oklahoma State College, Altus, OK; the Jicarilla Apache Department of Education (JADE), Dulce, NM.; La Plaza Telecommunity, Taos, NM; the Technology Learning Center (TLC), Santa Fe, NM.; the Kirtland Technology Center (KTC), Kirtland, NM.; Cooperative Education Services, Albuquerque, NM.; the National Indian Telecommunications Institute, Santa Fe, NM; the Golden Apple Foundation, Albuquerque, NM; and the New Mexico State Department of Education, Santa Fe, NM.

Activities for Districts and Hubs This Quarter

- Network Design and Documentation Support
- Networking and Computing Consulting and Needs Assessment
- Specifications and Bids Reviews
- Onsite Networking Implementation Support (Consulting, Testing, Troubleshooting, ...)
- Providing Networking and Internet Workshops
- Technical Training for District and Hub Technical Support Team Members
- Proposal Preparation and Netdays Support

Site Support Summary

- Network Design and Documentation Support
 - College of Santa Fe
 - Cuba Independent Schools
 - Española Municipal Schools
 - Gallup-McKinley County Schools
 - Jemez Valley Public Schools
 - Mesa Vista Consolidated Schools
 - Northern New Mexico Community College
 - Santa Fe Preparatory School
 - St. Bonaventure Mission Schools
 - Taos Municipal Schools
 - University of New Mexico-Gallup
 - Wingate Schools (BIA)
- Walk-throughs/Needs Assessment/Basic Networking Consulting
 - Aztec Municipal Schools
 - College of Santa Fe
 - Española Municipal Schools (San Juan Elementary)
 - Gallup McKinley Schools
 - Jemez Valley Public Schools
 - Navajo Community College - Shiprock
 - Pine Hills Schools (BIA)
 - Rio Grande School, Santa Fe
 - Santa Fe Preparatory School
 - Shiprock Alternative School
 - South Conejos Schools, Antonito, CO
 - St. Francis Elementary School, Dulce
 - Taos Municipal Schools
 - University of New Mexico - Gallup
 - Wingate Schools (BIA)
- Specifications and Bid Reviews
 - Bloomfield Public Schools
 - Española Municipal Schools (San Juan Elementary)
 - Gallup McKinley Schools
 - Jemez Valley Public Schools
 - Taos Municipal Schools

- On-Site Networking Implementation Support
(servers, network installations, testing, software/hardware configuration and installation, etc.)
Central Consolidated Schools
Cuba Independent Schools
Dulce Independent Schools
Española Municipal Schools
Gallup McKinley Schools (Thoreau, EDC)
Laredo Community College, Laredo, TX
Las Vegas City Public Schools
Las Vegas Valley Public Schools
Northern New Mexico Community College
Peñasco Independent Schools
Pojoaque Valley Public Schools
Santa Fe Preparatory School
St. Bonaventure Schools
St. Francis Elementary School, Dulce
Taos Municipal Schools
To'Hajilee Community School (BIA)
University of New Mexico - Gallup
University of New Mexico - Zuni
Wingate Schools (BIA)
Zuni Public Schools
- Workshops and Technical Training – Included Attendees from these Districts and Hubs
Aztec Municipal Schools
Central Consolidated Schools
Crownpoint Institute of Technology
Dulce Independent Schools
Española Municipal Schools
Gallup McKinley Schools
Jemez Valley Public Schools
Jicarilla Apache Department of Education
Las Vegas Valley Public Schools (In-Service)
Mora Independent Schools
Northern New Mexico Community College
Peñasco Independent Schools (In-service)
Pine Hills Schools (BIA)
Pojoaque Valley Public Schools
Ramah Navajo School Board
Rio Grande School, Santa Fe
Santa Fe Public Schools
South Conejos Schools, Antonito, CO
St. Bonaventure Schools
University of New Mexico-Gallup
University of New Mexico -Zuni
Wingate Schools (BIA)
Zuni Public Schools
LANL TOPS Program, Summer Workshop Participants

- Grant Proposal Support
Gallup-McKinley County Schools
Wingate Schools (BIA)
Peñasco Independent Schools
Western Oklahoma State College, Altus, OK
- Netdays Support
Las Vegas City Public Schools
Taos Municipal Schools

Workshops and Technical Classes – We held seventeen workshops and inservices this quarter; five half-day, five one-day, and seven two-day workshops. Our workshop topics are selected and the workshops are designed each quarter based on participating districts needs. Sessions are primarily hands-on and are held in EduNets hub training centers or school labs. Class size ranges from 5-30. Participation this quarter included 207 workshop participants from 24 districts and hubs.

We held several workshops in sets - three mini-conferences - this quarter. May 19-22, we held two pilot networking workshops at Northern New Mexico Community College - Introduction to Networking (2 days) and Networking Fundamentals (1-day). June 9-12, we held two pilot Internet workshops at the NITI (National Indian Telecommunications Institute (NITI) in Santa Fe - Internet Research for Educators (1-day) and HTML Web Site Design and Development (2 days). June 23-26, we held five workshops at the University of New Mexico Gallup- Internet Overview and Electronic Mail (1 day), Internet Research for Educators (1 day), HTML Web Site Design and Development (2 days), Introduction to Networks (2 days), and Networking Fundamentals (1 day).

Instructors for workshops are drawn from LANL and our hub sites. Instructors this quarter included: Paxton Robey, NNMCC; Chris Holden, UNM-Gallup; M'Hammed Jebannema, JADE; Kurt Trahan, CNE, CES; Jerry Lopez, CIC-4, LANL; Ken Brown, CIC-2, LANL; and, Pat Eker, CIC-6, LANL.

Basic Novell 4.1 and Advanced Novell 4.1 - We sent six technical support team members from Central Consolidated, Aztec, and Dulce Schools to Novell 4.1 classes at CES in Albuquerque, April 22-24. They will provide Novell 4.1 support and train other support staff at their sites.

Introduction to Networks (2 sessions) - Participants in this two-day hands-on workshop build a small local area network, learning how to insert network cards, add memory, install a server, and other basic networking skills. Topics include Infrastructure, clients, servers, communications, troubleshooting, and PC familiarization. Class size was limited to a maximum of ten. We held two pilot sessions this quarter - one at Northern New Mexico Community College (NNMCC) and one at UNM-Gallup - and sixteen participants completed the course. Instructor: Paxton Robey, NNMCC.

Networking Fundamentals (2 sessions) - Participants in this one-day class get an overview of basic principles, technology, terminology and applications of computer networks and data communications. Topics include: kinds of networks, transmission methods, interfaces and equipment, data packets and protocols. Terms covered

include: LAN, WAN, MAN, routers, ethernet, token ring, TCP/IP, etc. This class is designed to be a compact overview of networking fundamentals. We held two pilot sessions this quarter - one at Northern New Mexico Community College (NNMCC) and one at UNM-Gallup - and twenty-three participants completed the class. Instructor: Jerry Lopez, LANL

Basic Novell 3.x - We sent six technical support team members from Dulce, Española, Gallup-McKinley and Wingate Schools and Crownpoint Institute of Technology to a two-day Novell 3.x workshop, May 27-28, at CES in Albuquerque.

Internet Research for Educators (2 sessions) - We held two sessions this quarter - one at the National Indian Telecommunications Institute and one at UNM-Gallup. Nineteen participants completed the class. Instructor: Chris Holden, UNM-Gallup/LANL.

HTML - Designing and Developing Web Sites (2 sessions) - We held two sessions this quarter - one at the National Indian Telecommunications Institute and one at UNM-Gallup. Twenty-four participants completed the class. Instructor: Chris Holden, UNM-Gallup / LANL.

Internet Overview and Electronic Mail (3 sessions) - We held two basic half-day email inservices at Penasco Schools and a full-day session at UNM-Gallup this quarter. Forty-one total participants attended. Instructor: Pat Eker, LANL.

Computer Assembly and Internet Software Installation and Use (2 sessions) - We taught two sessions, June 17-18, for participants in the LANL Teacher Opportunities to Promote Science (TOPS) Summer Institute, June 16-27, 1997. We also provided assistance with systems upgrades and will help with on-site system support for participants at their schools this year. Instructors: Paxton Robey, NNMCC; Ken Brown, LANL; and M'Hammed Jabanema, JADE/LANL.

Basic Internet Inservice - We provided an on-site inservice at Conchas Dam Elementary School on basic Internet access using their access software and equipment. Instructor: Pat Eker, LANL.

Partner Projects Support

Laredo Project – We are sharing EduNets materials, lessons learned, and experiences with two school districts and the Laredo Community College (LCC) in Laredo, Texas. As part of the Laredo Energy Research Project, a joint project of LANL and Customer Choice and Control (CCC), CSW Communications, Laredo. This quarter we worked on planning August and September workshops and technical support.

LANL Teacher Opportunities to Promote Science (TOPS) Summer Institute - We helped with system upgrades, software needs, and workshops on computer set-ups this quarter.

Golden Apple Foundation – We helped Golden Apple fellows set up their Internet conferencing software and provided equipment and training support at three sites this quarter.

Netdays Support – We are helping some of our schools with network planning review and network evaluations for Netdays. We also have sets of installation tools that we loan for the Netdays teams to use. We provided support and equipment for installation and testing for netdays in Las Vegas City Schools and Taos High School this quarter.

Awards and Progress Recognition – Gallup-McKinley County School District Progress and Team Awards - In May we presented Gallup-McKinley County Schools’ district, team, and individual recognition awards at their school board meeting. Crownpoint High School, Thoreau High School, and the District Office were presented special district recognition awards for networking progress. Six administrators were recognized for special participation and support; seven individuals received awards for exceptional workshop participation; thirty-six individuals received one or more workshop participation certificates; and, thirty-two individuals, one from each school, were presented district technology coordinators support team awards.

Welcome! EduNets New Districts, Hubs, and Partners

South Conejos Schools, Antonito, Colorado - This school district is located in southern Colorado, just north of Chama, New Mexico. Initial site visit, needs analysis, and onsite support have already been started, and the superintendent and elementary school computer lab coordinator attended the Santa Fe workshops this quarter.

Chama Valley Independent Schools - The Chama public school district was added to the workshop invitation list this quarter and will be added to the Region II support sites next quarter.

St. Francis Elementary School, Dulce, NM - Initial site visit, needs analysis, and onsite support have already been started.

Western Oklahoma State College was added to the program as a special non-New Mexico hub and research partner this quarter. We are working with WOSC to help them set up a hub site for rural Oklahoma schools in their area and hope to team them up with our New Mexico and Texas hubs for future Internet video conferences for K-12 schools. This quarter we partnered with them on a grant proposal and worked on planning workshops for K-12 educators and consulting for WOSC hub support staff for August.

The EduNets Team – The EduNets team has been referred to as “the Internet Swat Team for Northern New Mexico schools” by Kurt Steinhaus of the New Mexico State Department of Education. In the EduNets program, we have to customize the consulting and support provided to the school districts, colleges, and support partners in the program to meet the varied and constantly changing networking support and training needs. This requires a wide variety of consulting expertise and a lot of “people” networking. We have a wealth of computing expertise and knowledge in the Computing, Information, and Consulting Division at Los Alamos. We have three core team members, several people in the Division who work for us part-time on a regular basis, and many who we call on for specific questions and needs. We also have a wealth of computing and networking people in our districts and hubs that we can refer

others in their regions to for help. We also get some of these site support people to help do workshops, both in their regions and for other regions and sites.

We'd like to extend a special thanks to this quarter's support team:

EduNets Core Team

Pat Eker, CIC-6, Program Manager/Project Leader (eker@lanl.gov); Tim Merrigan, CIC-5 (tcm@lanl.gov); and Ken Brown, CIC-2 (kcb@lanl.gov)

EduNets Extended LANL Support Team (Third Quarter FY97)

Jerry Lopez, CIC-4; Judy Ireland, CIC-9; Robert Martinez, CIC-5; and, Eric Anderson, CIC-4

EduNets Extended Workshop Team (Third Quarter FY97)

M'Hammed Jebanema, Jicarilla Apache Department of Education and LANL summer employee; Chris Holden, UNM-Gallup and LANLsummer employee; Paxton Robey, Director Computer Services, Northern New Mexico Community College

Also, a special thanks to CIC-2, CIC-6, CIC-8 for ongoing special needs consulting, to Joe Klechka, CIC-2, for reflector and consulting support, and to the LANL travel office for their efficient and friendly help with our travel arrangements.

Model Nets: A National Study of Viable Models of Networking Technology in K-12 Education

Judith Kaye, HR-6

Work continued on the editing of the draft version of the Model Nets Guide. The Model Nets Guide, a hard-copy, loose-leafed format book, is meant to step school districts through the process of network planning, implementation and evaluation. The Guide was piloted with nine New Mexico school districts ranging from schools beginning the planning process to intermediate planning and implementation. Site visits were made to each participating school district where feedback was gathered for the improvement of the Guide. The Guide is available as an HTML web page and will be linked to the Model Nets Report and other appropriate sites. In addition to pilot phase, meetings were held on a regular basis with the PI and the program coordinators to maintain product and report coordination.

The URL of the full report is:

http://www.education.lanl.gov/RESOURCES/Model_Nets/final/LALP-96-43.pdf.

The URL of the draft Guide is:

<http://www.education.lanl.gov/RESOURCES/MNGuide/MNG.pilot.1.pdf>.

Systems Modeling for Education (SME)

Dolores Jacobs STB/SE

The SME team has written JAVA code that forms the basis of the overall program. This includes the materials property manager, the units converter, the physics module, the image processor, and the beginnings of the graphic user interface. The team is currently tasked with and has almost completed the connectivity of the modules in a single functioning example of a user-initiated physics-driven, image and data presenting, heat transfer problem – the melting of an ice cube. When complete, all of the core elements will be in place and communicating with each other. This will permit the focus of the work to shift heavily to the enhancement of the graphic user interface, refinement presentation schema, and broadening the available materials definitions.

Equipment for Education

Karen Martinez, STB/SE

For the third quarter of FY97, the Equipment for Education program gifted 67 computers to 39 schools in Northern New Mexico through the TOPS, RTEP, and Science 2000 teacher development programs. This equipment had a value of \$203,533.

CURRICULUM IMPROVEMENT

Risks, Rewards, and Responsibilities Curriculum Development

Andy Andrews, TSA-9

Activity on this project was minimal during the reporting period because of funding constraints. However, two activities of note were conducted. First, materials were ordered and assembled for 70 additional Risks, Rewards, and Responsibilities kits. Support for these kits came from HSE Division in response to a request from State of New Mexico emergency preparedness offices. These kits will be distributed to personnel on-call for emergency action within the state.

Second, a paper, in part supported under the Curriculum Project, was presented at an international forum. The paper entitled A Non-Euclidean View of Teaching was given at the 1997 Ed Tech/Ed Media Conference held in Calgary, Alberta, Canada. The paper is available as LA-UR-96-1690.

PUBLIC UNDERSTANDING OF SCIENCE

Practical Applications for Young Science Communicators (PAYS)

Mark Muller, STB/SE

PAYS has the unique opportunity to address two pressing issues in 1997: improving public understanding and awareness of science (public literacy), and tapping the talents of the students who can translate laboratory science into understandable terms. The goals of the program are to demonstrate the relevance of science to everyday life, and appealing to the audiences who will receive most of their information about science from the media, museums, and libraries. The 1997 project outcomes were to have students: (1) design a web page for the program, (2) create a museum tech room display linked to the web page, (3) develop an electronic newsletter via the web page, (4) conduct interviews with environmental scientists, (5) develop a hyper-studio display of the overall project with an introduction to the Bradbury Museum's Tech room, and (6) create a poster display at the Otowi Building .

Program evaluation showed that the 10 participants from Northern New Mexico's high schools achieved the following objectives: (1) enhanced communication skills in science; (2) increased knowledge of laboratory science; (3) increased knowledge of science communication careers; (4) increased understanding of and experience in designing effective multimedia science communication products, and (5) improved ability to work in diverse, productive teams.

Science Education Information On-line

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During the third quarter of FY97, the PI participated with the LANL WWW editorial board to coordinate the education WWW site with other LANL WWW activities, provided updates to server software and support utilities, provided updates of the server file structure, assisted the New Mexico State Department of Education (NMSDE) and expanded the information on several program descriptions on the WWW.

The LANL WWW editorial board has been activated to review updates to the external LANL WWW pages. The major activity this quarter was to update the education information on the external Laboratory WWW site. The education WWW site plays a key role in providing information about the many education programs sponsored by the Laboratory. The uniform resource locator (URL) for the LANL external education WWW page is:

<http://www.lanl.gov/external/education/>

I continue to work with the NMSDE in several areas. These efforts include assistance with their WWW server, implementation of an e-mail list processing program (majordomo), assistance with PPP connections to the Internet via NM Technet and teaching department personnel the Hypertext Markup Language (HTML) so that they may create WWW pages for their server.

The most active education programs during this last quarter in updating information on the Science Education WWW server was the Critical Issues Forum (CIF) team and the Model Nets Guide team.

From April 1 through June 30, 1997, there were 12,925 different sites from over 76 different countries producing 114,823 requests of information from 1,563 distinct files for an average of 1,266 requests per day. These visitors transferred 56,239 pages representing more than 1.12 terabytes of data. Each day detailed statistics for the month are updated and summaries are available for viewing on the server. The uniform resource locator (URL) for the server statistics is:

<http://education.lanl.gov/webstat.html>

The top eight subject areas of interest on the server for this quarter were:

1. Science Education Program information and status reports (21106 hits)
2. NTEP National Teacher Enhancement Program (17370 hits)
3. Critical Issues Forum Program (10913 hits)
4. Science at Home (10310 hits)
5. Hydrogen Conference (10006 hits)
6. NM On-line Internet Institute (OII) (6175 hits)
7. New Mexico Supercomputing Challenge (5238 hits)
8. Model Nets Program (4252 hits)

The uniform resource locator (URL) for the EPO science education WWW server is:

<http://education.lanl.gov/>