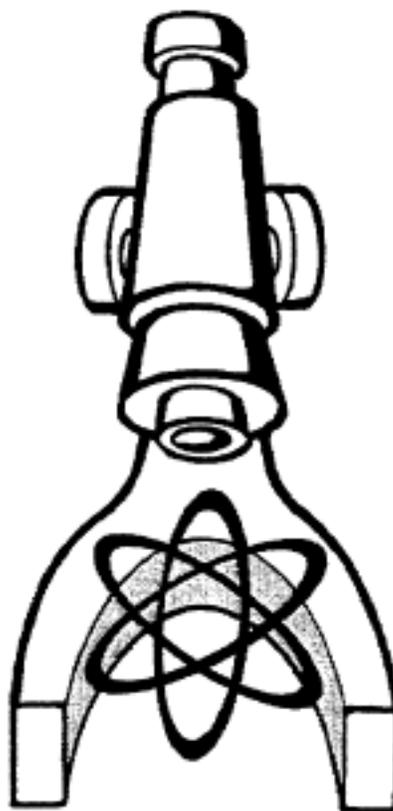
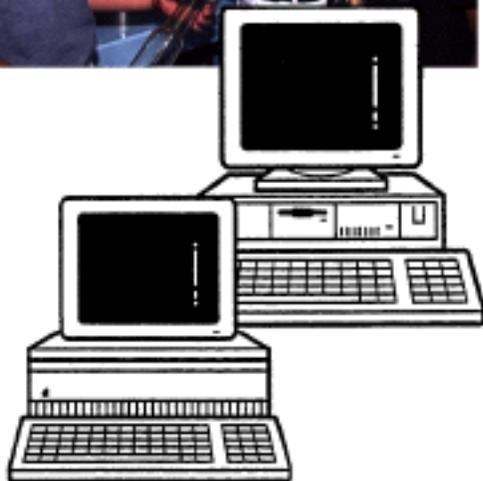


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***Los Alamos National Laboratory  
Science Education Program***

Progress Report  
January 1 –March 31, 1997



**Los Alamos**  
NATIONAL LABORATORY

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

**January 1 – March 31, 1997**

Los Alamos National Laboratory

Mail Stop F671

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LOS ALAMOS NATIONAL LABORATORY

SCIENCE EDUCATION PROGRAM

PROGRESS REPORT

January 1 –March 31, 1997

**TEACHER ENHANCEMENT**

**Teacher Opportunities to Promote Science (TOPS) & Regional Teacher Enhancement Program (RTEP)**

*Connie Witt, STB/SE*

During the second quarter of FY97 Los Alamos National Laboratory (LANL) accomplished the following in the TOPS and RTEP programs:

Recruitment for the fourth cohort of TOPS (Teacher Opportunities to Promote Science) and the first cohort of RTEP (Regional Teacher Enhancement Program) was conducted jointly. 92 completed application forms were received from across northern New Mexico in February and participants were selected in March. Invitations to participate were sent out to 53 teachers. As described in the recruitment materials, the selection criteria were weighted to favor districts and/or regions with applicants to both TOPS and RTEP. Based on that criteria, the Four Corners and Santa Fe/Española Valley regions are targeted as the areas to be served for this program cycle.

Teachers are also being recruited from these target areas for the high school program, Science 2000. TOPS, RTEP and Science 2000 participants will form district and regional teams of teachers to develop networking across the elementary, middle, and high school levels.

**Science 2000 Summer Institute for Teachers**

*Bill Robertson, STB/SE*

Fourteen teachers from the 1996-97 cohort attended the second follow-up workshop held on March 14-15 at the Canyon School Complex. Each teacher presented student models currently being developed in preparation for the Student EXPO, to be held at Los Alamos National Laboratory on Friday, May 2. Two Laboratory scientists from the Advanced Computer Lab attended the presentations and provided feedback to the participants.

At the workshop, the group finalized the agenda, evaluation rubric, and format for the Student EXPO. The teachers also developed a plan to continue their network through the use of e-mail, a web page and an ftp site.

The program coordinator presented a paper on the program at the Association for Supervision and Curriculum Development (ASCD) National Conference on March 24 in

Baltimore, Maryland. Thirty educators (HS teachers, HS administrators, Directors of Instruction and University instructors) attended the presentation.

Program coordinators continue to plan for the summer institute with recruitment packages sent to target schools in early March. The summer institute will run in conjunction with both RTEP and TOPS in order to develop a comprehensive K-12 teacher development program. The summer institute will be held at the Laboratory June 16 - 27.

## **STUDENT SUPPORT**

### **Summer Experience for the Economically Disadvantaged (SEED)**

*Dolores Jacobs, STB/SE*

Project SEED, a 16-week student program for eligible high school juniors and seniors, begins June 16 and is slated to run in the summer of 1997. Application materials were mailed out to all area high schools, and site visits were completed as of early April (to encourage more involvement by students in Northern New Mexico). In addition, program materials were made available to Native American students through contacts provided by the Laboratory coordinator for native American education programs. The application deadline is April 30, 1997.

### **Critical Issues Forum (CIF)**

*Rick Alexander, Bill Robertson, STB/SE*

All participating teams completed the 6 benchmark assignments successfully and utilized electronic communication to transmit their assignments to program coordinators. Abstracts of the student work can be found on the Critical Issues Forum web site located at: <http://education.lanl.gov/resources/cif/>.

A workshop was held for northern New Mexico participants at the Technical Vocational Institute in Albuquerque on Friday, February 21, 1997. A second workshop was held for southern New Mexico participants at New Mexico State University in Las Cruces on Friday, February 28, 1997. Approximately 115 participants attended the two workshops. The student participants were involved in the development and delivery of a position statement that was presented in a mock UN style format. Staff members from NMSU also participated in the student discussions and helped teams refine their debate positions.

An article on the Critical Issues Forum, authored by the program coordinators, was published in the March issue of The Science Teacher, a nationally recognized science education resource.

Program coordinators began preparations for the final Forum event to be held at Los Alamos National Laboratory on Friday, May 9, 1997. All participating teams will attend and deliver multimedia presentations that will relate to the Laboratory's Global Nuclear Visions Project.

Program coordinators, working in cooperation with staff from TSA-9, led a visiting student group from Ladysmith High School in Wisconsin in a series of web based activities on March 26, 1997.

### **New Mexico Supercomputing Challenge**

*David Kratzer, CIC-6*

The new pentium pro, mode.lanl.gov, was made the "default" Challenge machine in January and has been providing very good response time for the students as they use e-mail and edit programs. A few problems have come up with the software and we have been able to solve the problems and provide feedback to the maintainers of the

software. This is another case where the Challenge has taken new approaches or used new software which has benefited the LANL computing environment by providing testing/learning opportunities for the system managers.

Six one-day regional training sessions were held in January at: Eastern New Mexico University in Portales on the 14th, New Mexico State University in Las Cruces on the 16th, New Mexico Institute of Mining and Technology in Socorro on the 17th, University of New Mexico-Gallup on the 21st, University of New Mexico-Albuquerque on the 23rd, and Santa Fe Community College on the 28th. Students were given instruction in Unix, HTML, and public speaking. They showed off their programming skills competing for the regional hot-shot award and had opportunities to ask questions about their projects. The time-line for the rest of the year was discussed and suggestions were given to help them in preparing their final report.

We have been working on the 1997 Summer Teacher Training Session by evaluating textbooks, purchasing supplies, and sending out applications and acceptance letters. This summer's STTS will be held at New Mexico Institute of Mining and Technology 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 firm up plans. Participants will receive a stipend, textbooks, and room and board, along with graduate credit.

We are making preparations for the Awards Day activities that will take place April 29th through May 1st. Hotel rooms have been reserved, food services contacted, DOE visitor badges approved, registration web pages created, certificates designed, trophies ordered, and such.

Several people and organizations have requested information about the Challenge. We provided information to Dr. Lynne Petterson of the EPA who would like to start a similar program. We submitted an article about the Challenge to Gretchen Jacobson, Staff Writer, CRPC External Relations, at the request of Ann Hayes, Advanced Computing Lab. We submitted information about the Challenge to Burgess Laird for the CIC HPCC Institutional Plan. Virginia Romero had a Challenge display at the State Legislature for Lab Day.

## **Summer of Applied Geophysical Experience (SAGE)**

*Scott Baldrige, EES-1*

In January, the SAGE faculty held two workshops on the campus of San Diego State University, one workshop in seismic data processing and the other in interpretation and modeling of gravity and electromagnetic data. Attending the workshops were last year's "undergraduate" students who were partially supported by NSF's Research Experiences for Undergraduates (REU) Program. The workshops, which we have sponsored for the last several years, have proven to be an effective means of reinforcing, continuing, and strengthening the previous summer's SAGE experiences. They allow students to investigate selected geophysical projects in greater depth.

The level of activity picked up this quarter in preparation for the summer's main program. In February we finished the annual mailing of information about SAGE to all earth science departments listed in the American Geological Institute's Directory of Geoscience Departments, and to individuals who have expressed interest in receiving

the information. This broad mailing has proven to be the only effective approach for reaching students from small colleges and universities, many of which do not have dedicated programs in geophysics.

The SAGE web page (<http://geont1.lanl.gov/SAGE/SAGE.htm>) has also proven to be a very successful method of distributing information. In March, the SAGE faculty held their annual spring meeting in Los Alamos to plan for the summer's program. Agenda items included the overall schedule for classroom and field work, coordination of field activities, vehicle use, equipment needs, teaching assistants, and participation by company personnel. For example, we again anticipate the participation, on a cost-sharing basis, of the Colorado School of Mines (CSM) seismic crew under the direction of Professor Tom Boyd. For the last several years, CSM has made important contributions to SAGE. We also expect, for the second year, to augment the standard industry-type seismic survey by use of stand-alone seismometers from the PASSCAL instrument center. The equipment and techniques provide students with a unique opportunity to participate in a relatively large scale seismic survey.

SAGE 1997 will again make use of the facilities of the College of Santa Fe for dormitories, meals, and classrooms. Contact with prospective students and with faculty members has been at a high level this quarter, and student applications are currently arriving fast and furiously. From the applications, it appears that SAGE 1997 will comprise the diverse group of highly motivated and talented students that we have come to expect, although we will probably accept fewer students (25) than last year.

### **Historically Black Colleges and Universities (HBCU)**

*Pamela Bivens, STB/UP*

The Historically Black Colleges and Universities (HBCU) Program has successfully transferred hands from one coordinator to another for 1997 and beyond. Efforts are underway to ensure a rewarding and unique summer experience for those students accepted to intern here this summer. Recruitment efforts have spanned conferences geared to students and administrators, professional meetings, numerous successful campus visits, and collaboration of student information with the other national laboratories.

- Program Development
  - Correspondence of introduction was sent to the engineering, computer science, physics, chemistry, and math departments at each of the 25 selected HBCUs.
  - Letter was sent to the Housing Office to accompany their correspondence to students to reiterate their responsibility as an intern regarding housing policies.
  - Developed the HBCU Program student and mentor criteria with Betty Harris, assistant program coordinator.
  - Developed the "Academic Advisor Form" to further ensure student credibility and maturity prior to their formal acceptance into the summer intern Program.

- Met with the former HBCU program administrator, William Gamble, to clarify Program information; and for basic insight into how to develop the HBCU Program for the future.
  - Successfully coordinated subcontract renewal for equipment at North Carolina A&T State University to provide continued support for campus research.
  - Working with the LANL Public Relations Office and the Executive Editor of Black Issues in Higher Education (BIHE) to have a story published on the student interns this summer. This will serve to begin compiling historical data on the HBCU Program.
  - The joint LANL/Southern University Fuel Cell Project initiated by Betty Harris has progressed. Four students have been identified and selected to conduct research at the Lab for year-long appointments.
  - HBCU Coordinator was selected to participate on the LANL Diversity Council. This appointment should enhance our student program activity and support as their efforts will be student centered this year.
  - Continue to develop the HBCU Program Advisory Council. This group should be in place by January, 1998. These individuals will consist of college and university presidents, DOE personnel, and LANL team or division leaders. Their role will be to serve as advisors, monetary supporters/advocates, etc. to the HBCU Program.
  - Working to institutionalize recruitment efforts with Sandra Landry and Cathy Mujeres.
  - Collaborations with the other national laboratories have resulted in the receipt of resumes on more students to consider for the HBCU Program this summer. This invaluable network, as a result of the professional conferences and meetings, has proven beneficial. We have agreed to work consistently to enhance each other's programs.
- Recruitment Activities
    - Professional Meetings/Conferences Attended
      - University of New Mexico Minority Engineering Program Advisory Council (MEPAC)  
*January 17, 1997, Albuquerque, New Mexico*
      - National Association of Minority Engineering Program Administrators (NAMEPA) Meeting  
*February 21, 1997, Albuquerque, New Mexico*  
(attended with Kenneth Holley, Sandia National Laboratory)
      - Fossil Energy 5th Annual HBCUs and Other Minority Institutions Program Energy Research and Development Technology Transfer Symposium  
*March 4 - 5, 1997, Baton Rouge, Louisiana*

The National Association of Minority Engineering Program Administrators (NAMEPA) and Women in Engineering Program Advocates Network (WEPAN) First National Joint Conference  
*March 8 - 11, 1997, Vienna, Virginia*

– Student Conventions/Conferences Attended

The University of New Mexico's National Society of Black Engineers (NSBE) Chapter, Black History Month Program  
*February 22, 1997, Albuquerque, New Mexico*  
*Speaker: Betty Harris, Ph.D.*

National Conference of Black Physics Students (NCBPS)  
*February 27 - March 2, 1997, Cambridge, Massachusetts*

National Society of Black Engineers (NSBE)  
*March 26 - 30, 1997, Boston, Massachusetts*

– Campus Recruitment Visits

Southern University and A & M College, Baton Rouge, Louisiana,  
March 4-5, 1997

Howard University, Washington, DC, March 7, 1997  
*Department of Genetics and Human Genetics, College of Medicine*

Hampton University, Hampton, Virginia, March 24 - 25, 1997  
*School of Engineering and Technology*  
*Department of Physics*

**Mentored Collaborative Research With Resident University Teams**

*Abad Sandoval, STB/UP*

- This program (MCRP) 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 come 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.
- Plans are underway to expand the MRCPP to two and possibly three projects. One of the new projects being considered will be an advanced manufacturing project working with weapons engineering technical staff.

## **Underrepresented Minority/Female Initiative**

*Abad Sandoval, STB/UP*

- Currently there are 7 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.
- Plans are underway with UNM-LA to develop this summer's (1997) eight week summer institute. About 20 students are anticipated to be participants.
- Recruited at four minority conferences for summer interns: Mexican American Engineering Society (MAES), the Society of American Chicanos and Native American Studies (SACNAS), the American Indian Science & Engineering Society (AISES), and the Society of Hispanic Professional Engineers (SHPE).
- Working with New Mexico State University to place five students to do a summer research project. 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 science, engineering, math, or technology type degree.
- Placement of UGS and GRA student for summer internships at LANL is underway.

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

*Lee Collins, T-4*

In this quarter, we have completed our recruitment efforts and made our selections for the summer class. We received nearly 100 applications from around the country. Each year, the overall quality of the applicants appears to improve, and our selection process becomes more difficult. The selection committee, consisting of two LANL and two UNM representatives, met on March 3 at the UNM branch in Santa Fe. We chose an initial list of 16 students with 4 backups. As with last year, the choice was evenly split between male and female applicants. This continues a trend over the past few years of attracting a very strong pool of women science majors. The class again remains primarily undergraduates with only about 15% first-year graduate students. The geographical distribution is broad from Alaska to California, across the mid-West, to Florida and New York, in addition to 3 students from New Mexico universities. We have also maintained a balance between large and small universities. The final mix has yet to be established as the deadline for acceptance is April 1.

We have begun establishing our mentors for the student research projects and lecturers for a variety of topics. Prof. Alex Gaeta from Cornell has already agreed to give a series of lectures on nonlinear optics, and Dr. Eddie Timmermanns, a postdoctoral fellow at Harvard and very popular lecturer last year, will return to talk on Bose-Einstein condensates and ion traps, two very "hot" topics in AMO physics. We also expect a large participation from the LANL and UNM staffs. Organization has begun for several visits to Laboratory facilities and to the Santa Fe Institute, as well as a series of parallel computing classes.

We have entered the logistics phase of the school, attempting to coordinate student travel plans, to arrange for Laboratory visitor status, to provide access to various

computer sites, to establish communication links with all participants, and to secure accommodations. As before, classes and computer usage will be from the UNM-LA campus.

Finally, a paper written by two of our students, Noah Clay and Steven Carr, under the mentoring of Dr. Michael Murillo of the Laboratory, has been accepted for publication in the Journal of Quantitative Spectroscopy and Radiation Transport. The paper describes studies on atoms in magnetic fields performed during the Summer School session of 1996. Several other students have extended their summer research into projects at their home institutions.

### **Undergraduate Research Semester (URS replaces SERS)**

*Dolores Jacobs, STB/SE*

The Spring 1997 URS Program was just past half-way by the end of March. There are 21 students this semester comprised of 9 females and 11 males. They also comprise 7 graduating seniors, 4 seniors, 8 juniors, and 2 sophomores. The programs in which they are involved represent 9 divisions. All 21 site visits (meetings with the students and mentors) were completed and things are going well. The mentor/student matching process for the Fall 1997 class began in March with the review of 41 excellent mentor project proposals and 47 student applications to fill 25 URS positions.

### **Regional Two-Year College Initiative**

*Abad Sandoval, STB/UP*

- Working with the Northern New Mexico Rural Educators Network that has 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.
- Continue to work with LANL property staff in trying to get equipment out to some of the postsecondary schools. The LLNL model of equipment donation is being discussed with the DOE/LAO and the DOE/ALO to see if we can use the same procedures for equipment donations.
- Four students have been working as part time UGS students. One graduate student has been an offsite 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.
- Preliminary collaborations with New Mexico State University (NMSU) and 12 two-year postsecondary institutions have begun in a joint effort to develop a New Mexico advanced manufacturing technology consortium. Plans to create this consortium will be to establish technology centers of excellence in New Mexico. A preliminary proposal has been drafted and is being reviewed by participating institutions. Private sector companies (Intel, Phillips, and Allied Signal) have been invited to discuss their participation in this initiative. A planning meeting is scheduled for sometime in April or May.

- 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.
- Plans are underway to involve a student/faculty team to participate 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 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.
- Preliminary discussions with the Navajo Community College are underway to discuss the continued support for their Geographical Information System (GIS) summer program which they hope to incorporate as part of their curriculum.
- Hosted three students and a faculty member from the United World College for a week-long research experience in the areas of geophysics and geothermal energy.
- Placement of faculty/student teams for summer internship at LANL is underway.

### **Faculty and Student Teams (FAST)**

*Dolores Jacobs, STB/SE*

Two teams have been accepted as summer participants. A LANL mentor will join a team from (1) the University of California at Hayward and (2) New Mexico Highlands University. The potential teams from the University of Alabama and the University of California at Irvine will not be able to participate. Two other potential teams are “in the works” with potential university collaborations at Carnegie Mellon, Chatham, Penn State, or New Mexico Highlands.

## **EDUCATIONAL TECHNOLOGY**

### **Teaching Hearing-Impaired Students to Speak**

*George Papcun, CIC-3*

We are pleased to report that this project was chosen by the Chief Medical Officer for the Department of Energy, Steven Galston, M.D., to be submitted for consideration for the forthcoming White House Conference on Early Learning and the Brain.

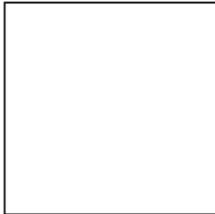
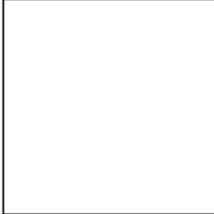
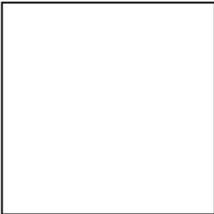
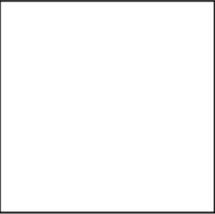
Mathematical Developments – From a computational standpoint, our focus continues to be on methods for including consonants in the system. We realized early that this would be especially challenging, and it continues to be, but we are continuing to make demonstrable progress. Our initial approach was to use a "window" on the data that varied in the amount of data that was observed depending on the context. Although this was an improvement on a window of static length, it washes out distinctions when the window gets too long. Therefore, we have gone to the use of multiple overlapping windows. Although this approach is computationally expensive, it appears to produce significantly improved results. The mathematical underpinnings of this approach are now well developed, and we are writing the computer code to implement it. In the forthcoming reporting period, we expect to run this code, and to report our results on a wide range of consonants.

The development of the mathematics for our immediate purposes has led to a surprising further development. It turns out that the mathematical formulation that was developed for teaching the hearing impaired may also be useful for estimating nuclear yield on the basis of various input factors. Whereas for our purposes, we are using paired acoustics and articulatory data, for estimating nuclear yield we can use paired data on nuclear device composition and yield data. We have written a brief treatise on this topic, which is available on request.

IPO Contact – Through the IPO, we have been introduced to Robert Curtis, a venture capitalist from the Silicon Valley area, who visited Los Alamos to assess opportunities for venture capital investments. Together with a team of neuropsychologists, Curtis is developing systems for rehabilitating stroke victims, who often lose the ability to speak. He believes our system may have application to such rehabilitation. He will let us know within the month whether his consultants believe our system has potential applicability to his venture.

Interactive Training System – As mentioned in our previous report, teachers at the School for the Deaf have indicated the need for interactive materials to help teach the positions required for articulating given words. To meet this need, we are developing several multimedia "games." Figure 1 shows a draft screen for an "Articulatory Puzzle." In this game, the student sees several game pieces, on each of which is a diagram of an articulatory configuration. The student must arrange the game pieces in the correct sequence in the boxes to make the designated word. Clearly, we will need

to make better pictures, but the most difficult aspect of this system was to track the positions of the pieces as the student drags them to the boxes. To make this system work correctly, we had to write dynamically linked libraries for the Microsoft Windows operating system.

<b>WANT</b>	<b>CHECK IT</b>	<b>CONTINUE</b>	
			
			

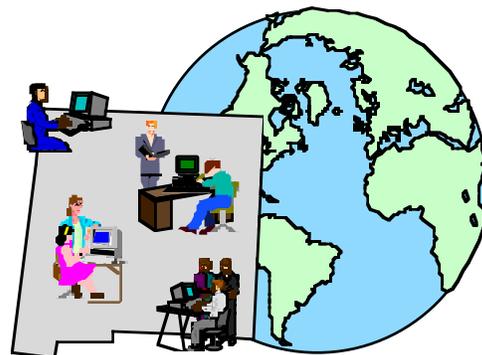
*Articulatory Teaching Exercise. The student must put the diagrams into the squares in the correct sequence to make the word "want".*

## 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.

**Updated EduNets 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 Onsite Support
Oct 95	9	5	17	102	> 50
Oct 96	16	11	37	124	> 80
Jan 97	24	15	44	157	> 100
Apr 97	31	16	52	185	> 130

Current Support and Partnerships Scope: 31 School Districts (24 public 7 non-public), 9 community colleges and universities, 12 other (3 departments of education, 3 regional technology centers, 2 support cooperatives, and 4 related LANL networking 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 one regional support center and partner this quarter - the College of Santa Fe. 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 .

**EduNets New Mexico Regional Training or 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
Apr 97	17	7 direct T-1, 8 direct 56Kb, 1 dial-up (CIT)	27 at 12 centers

Current hubs and partners include: UNM-Gallup, Gallup, NM; Crownpoint Institute of Technology, Crownpoint, NM; Northern New Mexico Community College (NNMCC), Española, NM; Navajo Community College (NCC), Shiprock, NM; Navajo Community College (NCC), Tsaile, AZ.; UNM-Zuni, Zuni, NM.; the College of Santa Fe, Santa Fe, NM; Laredo Community College, Laredo, TX.; NM Highlands University; 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.

**Primary EduNets Support Activities This Quarter:**

- Networking and Computing Consulting for School Districts and Support Centers
- Onsite Support, Troubleshooting, and Training
- Providing Technical Training for District and Hub Technical Support Team Members
- Technology Conferences Support and Presentations

Abbreviated quarterly site support summary:

School Districts

Bloomfield	Quotes and networking/equipment specs review and evaluation; WAN and LAN design support.
Central Consolidated	NT training for Regional NT training team member; Four-Corners Technology Conference support; network testing and troubleshooting.
Cuba	PC and software troubleshooting; testing setup for Internet video-conference presentations at Washington COSN Conference; reviewing network for possible update recommendations.
Dulce	Network and server support; technical support team Novell training.
Española	Abiquiu, Alcalde, Sombrillo, Velarde, San Juan, and Española High dial-up and e-mail support; San Juan equipment and line pricing; quotes and specs review; technical support team Novell training; NT server support.
Ft. Wingate	Reviewed 56Kb quote; requested dial-up access through NITI.
Gallup-McKinley	Network support for the District Office; Crownpoint High 56Kb pricing; meetings with new Superintendent about program support scope and current site needs.
Las Vegas West	Troubleshooting and setting up dial-up accounts for remote schools.
Las Vegas Central	Netday support for Las Vegas Middle School; network evaluation.
Mesa Vista	Technical support team Novell training; LAN and WAN design; proposal support.
Peñasco	NT server support; helped set up modem server; setup and training for school to homebound Internet conferencing project and COSN Conference presentations; NT training for Regional NT training team member.
Pojoaque	Network and server support; technical support team Novell Training; site progress awards and presentation to school board; testing setup for Internet video-conference presentations at Washington COSN Conference; district K-12 Technology Curriculum planning support.
Questa	Network support; site needs assessment.
St. Bonaventure	NT server set-up and training; network and lab set-up troubleshooting and support; 56Kb line testing; LAN documentation for next-step recommendations.
Taos	Golden Apple teacher setup and training for Internet conferencing evaluation project.
To'Hajilee	Server and library computer support.
Zuni	Dial-ups to UNM-Zuni; server support; workstation support.

## Regional Support Centers

Highlands University	Partner: Meetings and Netdays support for Las Vegas City Middle School.
NCC Shiprock	Dial-up troubleshooting; Four-Corners Technology Conference support; network testing and troubleshooting.
NITI	NT server support (the National Indian Telecommunications Institute).
NNMCC	Network, labs, and NT server support; training and workshops planning; NT support; Region III planning and awards meeting; team and hub commendations and awards; NT training for Regional NT training team member.
UNM-Gallup	Network support; server support; router configuration support; needs assessment.
UNM-Zuni	NT and modem server support; network support.

## Other Project Support

San Juan Pueblo	Network, labs, and server support - LANL Pueblo Project .
LCC	Training Support and Current Needs Assessment; basic Internet faculty workshops - DOE Laredo Energy Research Project.

## **Workshops and Technical Classes:**

Basic Internet Workshops – Workshops I and II (modified) - Laredo Community College Faculty Workshops, Laredo, Texas, January 6, 1997.

Advanced Novell 3.12 Networking Class – We provided an advanced hands-on Novell 3.12 workshop at CES in Albuquerque for ten EduNets site technical support team members from Dulce, Mesa Vista, Pojoaque, and Española school districts and the JADE and CIT support centers January 15-16, 1997. This class was the follow-up for the Basic Novell Networking Class that was held in December.

Basic and Advanced Novell 4.x Classes – We sent three technical support team members from Dulce, JADE and Española Schools to Novell 4.x classes at CES in Albuquerque, January 28-31. They will train the support teams at their sites.

NT Networking Workshop – We helped send three technical trainers - one each from Central Consolidated Schools, Peñasco schools, and Northern New Mexico Community College - to a Business Communications Review NT workshop held at UNM-Gallup March 4-7, 1997. Gallup-McKinley, NCC-Shiprock, UNM-Gallup, and NNMCC also sent technical trainers. The trainers will help with NT workshops in their regions this summer.

## **Technology Conference Presentations and Support**

K-12 Networking Conference, Consortium for School Networking (COSN) – The EduNets Program was part of a Science Education Program Office (SEPO) Exhibit at the second annual COSN conference in Washington, DC, March 16-18, 1997. The exhibit featured displays on LANL Science Education programs that provide support for schools related to networking - technical support for education, K-12 networking survey, and integrating Internet resources into the K-12 curriculum. Technical support team members, administrators, teachers, and students in the EduNets program from Cuba, Pojoaque Valley, Central Consolidated, and Peñasco school districts and from some of our regional hubs participated. They talked to conference participants from their schools, via Internet video-conferencing, about their Internet access, how they are using

it, and plans for the future. The conference presentations and display seem to have been a big hit; we have received requests and inquiries about information and support from participants from several states.

Four-Corners Technology Conference – The EduNets team provided networking support and manned booths at the Four-Corners Technology Conference in Shiprock, New Mexico, March 26-27, 1997. The event was held at the Shiprock High School - an EduNets supported site and regional training hub. We were asked to help with networking support, a display on the EduNets program, and a video-conferencing booth for participants. The conference was a lot of fun and many area students, teachers, tribal members, and parents attended.

### **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, we helped prepare and present a Faculty Internet Workshop at LCC in January. The workshop, held January 6, 1997, was very well attended and the feedback was great. We were presented a certificate of appreciation from LCC at the end of the day and the support from LANL was cited at the workshops. We gave materials to the LCC core support team to complete faculty basic Internet training and we gathered information for planning and future support needs to discuss with the CCC project team.

Internet Video and Audio Conferencing – Many of our school districts have expressed an interest in using Internet video and audio conferencing as they pursue their Internet connections and develop their long-range technology plans. We have started three evaluation teams for testing and providing feedback on Internet conferencing software in three areas: teacher and administration team communications, homebound teaching and interaction, and conference presentations. A variety of connection methods – dial-up, 56Kb, and T-1 access – are also being tested for each conferencing package and application. We have also established a reflector on a SUN workstation for EduNets participants to use and plan to establish another at NNMCC.

*Team I:* Conference Presentations over the Internet. Central Consolidated, Cuba, Pojoaque, Peñasco, St. Bonaventure, Las Vegas City, Dulce, NNMCC, UNM-Gallup, LCC, NMHU, and UNM-Zuni have already set up conferencing workstations at one or two sites and have participated in practice conferences.

*Team II:* Administration and Team Communication. We are partnering with Cooperative Educational Services (CES) in their effort to establish Internet video-conferencing for New Mexico Superintendents; we will provide support for the Superintendents in our EduNets program. We have also partnered with the Golden Apple Foundation to help their recipients set up Internet conferencing for team communications. In return, they will help us with evaluating conferencing software that we can recommend for our districts and use in our partnership effort with CES.

*Team III:* Homebound Teaching and Interaction. Peñasco Schools have provided a homebound student with a computer and we have helped them establish video-conferencing and e-mail communications between the school and the student, teacher

training, and support for a research case study of techniques for and effectiveness of using the Internet for homebound teaching and communications. NNMCC is providing dial-up access for the student who lives in a different phone district. Watch for the paper on this one later this year!

Netdays Support – We are helping some of our schools network planning, review, and completed network evaluations for Netdays. We also have sets of installation tools that we loan for the Netdays teams to use.

Las Vegas City Schools: Memorial Middle School follow-up evaluation and Legion; Park Elementary planning and installation.

Las Vegas West: Middle School network and Netday planning.

Taos High School: LAN design review and planing.

Gallup Schools: Thoreau High School follow-up evaluation.

We will also be assisting our Netday schools in establishing servers and Internet integration if needed after the infrastructure is in place. Our first efforts have been in support of our partnership with Highlands University; they have been doing a fantastic job in supporting the Netdays in the Las Vegas area and have offered to help with schools in some of our other districts.

Views of the Solar System – by Calvin Hamilton is sponsored, partially funded, and housed on the LANL WWW server “bang.lanl.gov” by EduNets. The site has received numerous awards including “Best of the Net,” “Best Education Award” by the Education Index, the Netguide “Platinum Award,” and the “Top 5% of all Web Sites” by Pointreview. When this project support started in 1994, we needed an application for teachers in our first districts to use in the classroom and our teachers in the Cuba district were some of the first to test and provide input on the web site. Check out <http://bang.lanl.gov/solarsys> for a popular science education resource. During March 1997, we had 106,945 accesses recorded to the main page, making a total of 1,011,420 accesses since January 1, 1996. The total access counts for all pages and images was 5,308,979 for March and a total of 46,966,079 since January 1, 1996.

## **Awards and Progress Recognition**

Pojoaque School District Progress and Team Awards – January 21, we presented a plaque to the Pojoaque School District and plaques and certificates of recognition to the Pojoaque EduNets site support team - Pancho Guardiola, Susan Quintana, Annette Fox, Yolanda Harrell, and Tom Farrell - for the internetworking progress their district has made over the past two and one-half years. The members of the board and the Superintendent, Art Blea, all thanked the LANL EduNets team for the support that we have given them and praised the outreach efforts of the Lab. The board also directed that special letters from the board be put in the Pojoaque teams' personnel folders recognizing their efforts and accomplishments. It was a very nice meeting. (This was the 4th of our district commendations so far this year.)

EduNets Region III Awards and Planning Meeting at NNMCC – January 24th, we held a regional awards and planning meeting for representatives from the school districts and support hubs in EduNets Region III - Española, Mesa Vista, Mora, Peñasco, Pojoaque,

and Questa School Districts and Northern New Mexico Community College (NNMCC) and La Plaza de Taos Telecommunity Foundation. We also invited representatives from the Pueblos that sent attendees to Internet workshops at Northern last year and that we provide site support through the LANL Industrial partnerships office. Forty-three representatives attended.

The main theme was "Thanks NNMCC!" Awards were presented to school districts for achieving internetworking progress levels and special recognition awards were presented to participating northern Pueblos and La Plaza. The following awards were presented: NNMCC was presented an award for campus internetworking and one for regional support and training for school districts and education sites - the award was accepted by Priscilla Trujillo, Executive Vice President at NNMCC. Paxton Robey, Director of Information Services at NNMCC, was presented a special recognition award for outstanding leadership and efforts at NNMCC. The members of the technical support team at NNMCC - Patricia Borrego, Liza Baldonado, and Nelda Montano - were recognized as an outstanding regional technical and training support team. Special recognition awards for internetworking efforts and staff attendance at Internet training at NNMCC were presented to the Eight Northern Pueblos Council and to the Cochiti, San Ildefonso, San Juan, and Santa Clara Pueblos. A special recognition for education support and partnership efforts with EduNets in Region I was presented to La Plaza de Taos Telecommunity Foundation for their support at Questa and Peñasco. Achievement level awards in Internetworking presented to the school districts were: EduNets Bronze awards (Basic first connections, technical support team in place, basic training completed) to Mesa Vista and Mora School Districts; EduNets Silver awards (Bronze plus first direct connections and training labs established) to Española, Peñasco, and Questa School Districts; and, EduNets Gold award (Silver plus direct connections to all schools, Internet Labs, and Web and/or e-mail Server) to Pojoaque Schools. The awards session was followed by a region updates and planning session and workshops on e-mail, ftp, and other communications tools were held in the afternoon. The meeting was fun and very informative; participants felt they obtained a lot of valuable input on region needs, appreciated the sharing of experiences and information, and expressed valuing the contacts made and the value of the people and resource networking within the region.

Region I Awards and Planning Meeting at UNM-Gallup – On January 28, we held a regional awards and planning meeting for representatives from the school districts and support hubs in EduNets Region I - Central Consolidated, Gallup-McKinley, Zuni, St. Bonaventure, and Wingate Schools and UNM-Gallup, Navajo Community College (NCC) - Shiprock, UNM-Zuni, and Crownpoint Institute of Technology (CIT). All sites were represented by the twenty-nine representatives who attended.

The main theme was "Thanks UNM-Gallup and UNM-Zuni!" with special farewells to Kent Brooks, UNM-Gallup, and other staff who have recently accepted advanced job offers elsewhere (Kent left for Oklahoma the next day). Awards were presented to school districts for achieving internetworking progress levels and special recognition awards were presented to site leaders in Internetworking efforts. The following awards were presented: Campus Networking and Regional Internet Training Support Awards were presented to UNM-Gallup, UNM-Zuni, and NCC-Shiprock for installing dedicated circuits, establishing Internet labs (which we have used for training teachers and others in the region), and providing support for schools and education sites in our program Region I. Robert Carlson, President of UNM-Gallup, accepted the award for his

campus. Special individual commendations for Technical Support and Leadership were awarded to Kent Brooks, UNM-Gallup, Ruth Haskie, UNM-Zuni, and Mark Bauer, NCC-Shiprock. EduNets Regional Support Team awards were presented to the UNM-Gallup EduNets team - Ed Allen, Pat Balok, Scott Hoffman, Chris Holden, Lorraine Hood, Roxanne Salvador, and Joann Wright. Achievement level awards in Internetworking presented to the school districts were: EduNets Bronze awards to St. Bonaventure and Zuni School Districts; EduNets Silver awards to Central Consolidated and Gallup-McKinley School Districts. Special recognition awards were presented to Crownpoint Institute of Technology (CIT) and to the Ft. Wingate (BIA) Schools. The awards session was followed by a Region I updates and planning session that was very successful - a lot of valuable information on region needs and resources was obtained and several "partnerships" were formed between the districts to share resources and expertise. The LANL EduNets team and LANL received a lot of thanks and praise for the support that we have provided and continue to provide the Region.

**Internet Access Connections Update: New Mexico EduNets School Districts**

Our primary goal is to assist schools in establish working and reliable Internet access.

Direct lines currently on order:

Bloomfield (T-1 and multiple 56Kb)  
 Crownpoint High School (56Kb)  
 Thoreau High School (56Kb)  
 Española High School (56Kb)  
 Santa Fe (56Kb for 4 schools)  
 Mora Schools (56Kb)

New direct lines installed so far this fiscal year:

Dulce (extended T-1)  
 Questa (56Kb)  
 St. Bonaventure (56Kb)  
 To'Hajilee (56Kb)  
 Santa Fe (T-1 Central Office, 56Kb - 4 sites)  
 Bloomfield (56Kb installed at 3 sites)

Region I

Bloomfield Public Schools

New 56Kb lines installed at Blanco and Naaba Ani schools and at Maintenance; T-1 ordered for Administration and the High School and 56Kb lines ordered for the other district schools; schools with lines ordered and the Central Office have at least one dial-up workstation now with dial-in access temporarily to the CCSD Kirtland Technology Center, New Mexico Technet or the Farmington Public Library; Internet training in progress at all levels; new Internet pilot with board member.

Central Consolidated Schools

56 Kb to Kirtland Technology Center (KTC) with spread spectrum to the Kirtland Business Office; 2MB line to Shiprock High School (SHS) from NCC-Shiprock. Line being extended from SHS to Tse'Bit'ai Middle and Natanni Nez Elementary in Shiprock. Another 56Kb ordered for Kirtland. The Kirtland Technology Center has 3 Internet labs with over 100 PCs with direct Internet access, a district WWW server, an e-mail server, and a modem server with 2 access lines. The Kirtland Middle school and 3 elementary schools in Kirtland have at least one dial-up work-station with access to the modem server at the KTC. The KTC is also helping Bloomfield schools by providing them temporary dial-in access until the Bloomfield lines are installed. Shiprock High has an Internet training lab with 30 workstations. Newcomb middle and high schools have at least one workstation with dial-up access to NM Technet. The Shiprock district offices and middle school have at least one dial-up workstation with access to NM Technet or the NCC-Shiprock campus.

## Region I (cont'd)

Gallup-McKinley School District	56Kb line to Gallup High extended to Central Gallup Offices. Eighteen district schools and the Educational Development Ctr. have at least one dial-up workstation with access to either NM Technet, a local provider, or a modem server at Gallup High. Orders for multiple lines are in process; bids being evaluated.
Shiprock Alternative School	Fiber connection planned to NCC-Shiprock hub; dial-up access now.
St. Bonaventure Mission Schools	New 56Kb line installed at High School. Setting up Internet lab and modem server (they have offered to help with access for other local Gallup-McKinley schools in Thoreau).
Wingate Schools (BIA), Wingate	New district - getting cost estimates, arranging dial-up accounts and helping set up dial-up workstations.
Zuni Public Schools	56Kb line to District Office from UNM-Zuni; 56Kb line to Twin Buttes High from UNM-Zuni. At least one dial-up workstation at each school with dial-up access to UNM-Zuni or NM Technet.

## Region I Support Hubs

Crownpoint Institute of Technology	Dial-up account and workstation - trying to team up with Crownpoint High for sharing 56Kb access.
Navajo Community College-Shiprock	T-1 line with 2 Internet labs, e-mail server and modem server with 2 lines. Collaborative effort with CCSD to combine NASA funds to get 2MB line to Shiprock High and dial-up access for local school sites.
UNM-Gallup	T-1 (upgraded from 56Kb). New Technology building with four large Internet labs. They have 7 campus Internet labs now. Helping with regional training; technical support classes; offering special Internet and networking courses for schools as well as credit classes.
UNM-Zuni	56Kb line installed. Lab set up and running with modem servers for remote access from local schools. First training sessions held in the lab in August; setting up new NT server this month. Ran 56Kb lines to Zuni Schools district office and to Twin Buttes High.

## Region II

Cuba Independent Schools	56Kb connections to all schools; Internet access from every classroom, library, and the district offices; WWW server; e-mail server; Internet lab - all in regular use. Tech support team in place and continuing training.
Dulce Independent Schools	T-1 connections to all schools and the District Office; infrastructure at schools being completed; Tech and training support team established.
To'Hajilee Community School (BIA)	56Kb line installed - New! Setting up NT server and Internet labs. Forming and training tech support team.

### *Region II Support Hubs*

Jicarilla Apache Department of Educ.	T-1 line installed; WWW server; e-mail server; Internet training lab; and tech support team all well established and in use. Doing community Internet classes and classes for San Juan College; providing technical support and temporary e-mail services for Dulce schools.
Cooperative Educ. Services (CES)	NA - Networking Training Center

## Region II (cont'd)

The Golden Apple Foundation

NA - Support Partner - Working with Individuals at sites in Northern NM

## Region III

Española Municipal Schools

56Kb line to Española Elementary School. 56Kb line ordered for Española High School; infrastructure completed at EHS. Tech team in place and active with accounts on server at NNMCC; first training labs at EES; dial-up workstations set up at 9 schools with access to NNMCC.

Mesa Vista Consolidated Schools

Dial-up workstations (2) at Mesa Vista High school with access to NNMCC; dial-up station at Tres Piedras with access to La Plaza; tech and training team in place and active with accounts on server at NNMCC.

Mora Independent Schools

Dial-up workstation shared by tech team from all schools; tech and training team in place; completing basic training; 56Kb ordered.

Peñasco Independent Schools

56Kb installed from La Plaza. Internet training lab established and in use for school and community training. Tech support team in place and active; research site for Internet distance learning.

Pojoaque Valley Public Schools

56Kb line to High School and Middle School; 56Kb line to Elementary and Intermediate school. Two Internet labs in operation; libraries online; guidance office actively online; WWW server; e-mail server; and EduNets tech and training support team in place and active.

Questa Independent Schools

56Kb installed from La Plaza. Internet training lab being established.

### *Region III Support Hubs*

Northern NM Community College

T-1 line; five Internet labs; regional training support; WWW server; e-mail servers; tech and training support teams in place and active; 56Kb line to the El Rito campus.

La Plaza de Taos Telecommunity

NA - ISP - Partnership support efforts.

## Region IV

Las Vegas City Public Schools

56Kb to High School; 56Kb to Middle School; lines ordered for elementary schools. Middle school and Legion Park Elementary networked (Net Day projects); three more Netdays planned in April.

Las Vegas West Public Schools

56Kb to High School; 56Kb to Middle School; lines ordered for elementary schools. Middle school networked (Net Day project).

Pecos Independent Schools

56Kb to High School

Santa Fe Public Schools

New - T-1 to Central Office and 56Kb lines to four more schools! Now 56Kb lines to 15 schools - Academy, Alvord, Atalaya, Capital High, Capshaw Middle, Carlos Gilbert (new), Chavez, Devargas JHS, E.J. Martinez (new), El Dorado (new), Ortiz Middle, Santa Fe High, Sweeney, Tesuque, and Turquoise Trail (new); 56Kb to Central Office; 56Kb to Technology Learning Center (TLC)

## Region IV Support Hubs

New Mexico State Dept. of Education	56Kb; approximately 10 staff offices connected; WWW server. - Check out their new Web Pages - they are great!
Technology Learning Center, Santa Fe	56Kb; Internet training lab; SFPS collaborative project with NM State Department of Education, LANL EduNets, Computerland of Santa Fe and Apple computers support. Provides training access for SFPS, ReLearning, SIMSE, and other programs.
National Indian Telecom. Institute (NITI)	56Kb; Internet training labs; WWW server; e-mail server; modem server with 800 access; training and access support for BIA and other Native American schools and institutions.
NM Highlands University	T-1. Partnership support efforts. Working with Las Cruces schools through a NASA grant.

## Extra Research and Test Schools

Las Cruces Public Schools*	T-1 to Oñate HS test site
Los Alamos Public Schools*	10MB to Los Alamos HS test site; 56Kb to Los Alamos Middle School.

\*Partial District Support: 1-2 Schools

## Outside New Mexico

Laredo Indep. Schools, Laredo, TX	ISDN
United Indep. Schools, Laredo, TX	ISDN
Laredo Community College, TX	T-1 and ISDN
Navajo Community College, Tsaile, AZ	56 Kb

## **EduNets New Districts, Hubs, and Partners**

Aztec, Jemez Valley, Jemez Mountain, and Taos School Districts – These public school districts have been added to the program and initial site visits and needs assessments, network design support for Jemez Valley and Taos schools, and individual school dial-up support in Taos for the Golden Apple site there are already in progress.

Santa Fe Preparatory and Rio Grande Schools – We added these Santa Fe schools to the program this quarter; have completed initial site visits, and are currently working with them on infrastructure design and providing networking consulting.

Pine Hills Schools – The Pine Hills Schools are located about 50 miles south of Grants, NM. The schools are Native American and grades 6-12 are boarding schools. We have completed an initial site visit, needs assessment, and consultation.

The College of Santa Fe – Was added as community support partner and training hub this quarter. We are working with the network administrators on campus networking design and are planning basic Internet workshops and Internet for Librarians workshops to be offered through the CSF campus for their region.

## **CURRICULUM IMPROVEMENT**

### **Risks, Rewards, and Responsibilities Curriculum Development**

*Andy Andrews, TSA-9*

During the past quarter, activities were minimized to conserve dwindling funds. The major activity was the hosting of students from Ladysmith High School in Ladysmith, Wisconsin. These students have been participating in the R3 curriculum and chose to visit New Mexico in conjunction with their physics, chemistry, and history classes. They visited the Laboratory during the period 25-27 March. While here, they participated in the following list of activities:

- Tours of the Bradbury Science Museum and the Los Alamos Historical Museum
- An introduction to the Critical Issues Forum
- Lunch with the Lab Director
- A visit to the Los Alamos Neutron Science Center
- A tour of the Neighborhood Environmental Watch Network facilities and briefings on NEWNet and the Nevada Test Site
- A briefing on Alexis by a recently graduated physicist working on the satellite project
- A hands-on tour of the critical assembly facility

Shown below, Gretchen Bucki of Ladysmith High School in Ladysmith, Wis., uses a control stick to operate the SHEBA critical assembly device at Technical Area 18. Charlene Cappiello, right, of Advanced Nuclear Technology (NIS-6) guides Bucki. The two were in one of the control rooms where they could safely and remotely operate SHEBA.



Other events during the quarter included inquiries from NM State environmental people about obtaining additional copies of the curriculum (about seventy) and doing a workshop for them in the fall. This will require additional funding which may be available within the Lab. However, as of this writing, funding has not been identified.

Finally, a new book "America Online for Teachers" published by IDG Books has listed the SWOOPE Acid Rain project as one of 40 featured online projects for the classroom. SWOOPE, which stands for Students Watching Over Our Planet Earth, was developed at the Laboratory several years ago and was a precursor to the Risks, Rewards, and Responsibilities project.

### **Rayleigh-Taylor Instability Demonstrations for Pre-College Education**

*Robert F. Benjamin, DX-3*

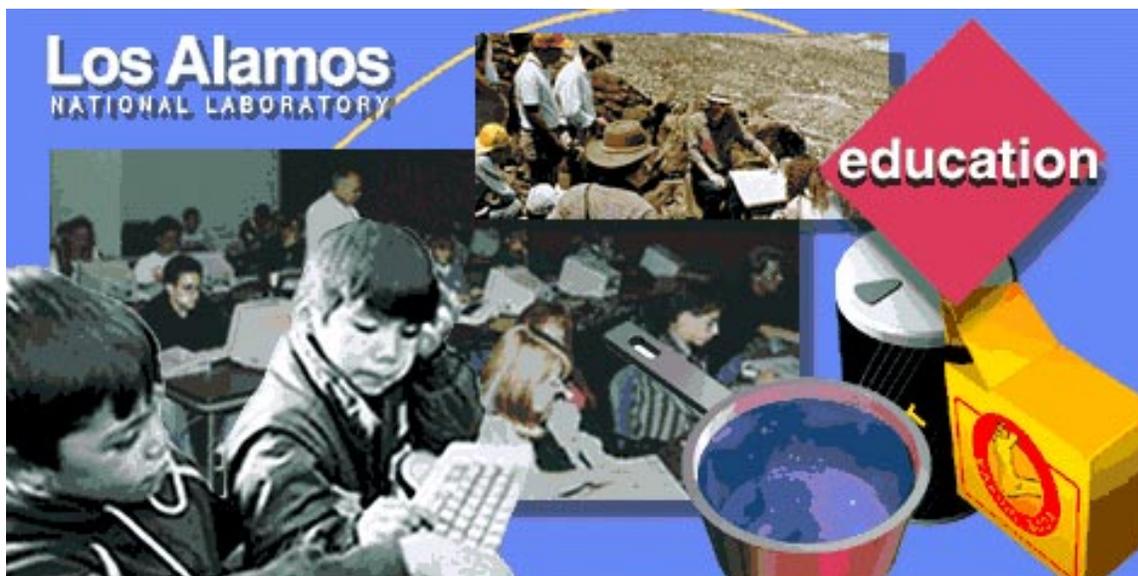
Another article of the "Spills and Ripples" series was published in the March 1997 issue of the AIMS Magazine (volume 11, number 8). "Flow Fingers" is the cover story and describes the flow patterns characteristic of Rayleigh-Taylor Instability. The activity is designed to help students learn that some features of unstable flows are reproducible but others are not. This AIMS issue also includes an article on pattern-based math, "A Touchy Situation," co-authored by Bob Benjamin.

Bob also was the featured luncheon speaker at the Advanced Placement Science Conference (sponsored by The College Board) at Santa Fe on 1 March 1997. The talk, "The Mysterious Stability of Upside Down Fluids," was well received by over 170 high school teachers from a four-state region. The talk included a hands-on component so all teachers could experience the excitement of blocking Rayleigh-Taylor Instability and thereby confining water in an upside down glass.

## PUBLIC UNDERSTANDING OF SCIENCE

### Science Education Information On-line

*Robert Judd, CIC-6*



During the second quarter of FY97, the principle project activities included updates to the program information on the WWW, moving of the server location, participating with the LANL WWW editorial board to coordinate the education WWW site with other LANL WWW activities, updates of the server file structure, assistance to the NM State Department of Education and the expansion of information on several programs.

The major activity this quarter was to update all of the FY97 program information within the Education Program Office. We also implemented a scheme for including information about former or currently inactive programs. The URL changed for this program information. The new URL is <http://education.lanl.gov/EPO/> which reflects the name change of the program office within STB.

The LANL WWW editorial board has been reactivated to review updates to the LANL WWW pages. The education WWW site plays a key role in providing information about the many education programs sponsored by the Laboratory.

The coordinator continues to work with the New Mexico State Department of Education (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. Two full day workshops on HTML were presented in December to about 35 people from the NM SDE.

The most active program during this last quarter in updating information on the Science Education WWW server was the Critical Issues Forum (CIF) team.

From January 1 through March 31, 1997, there were 36,981 different sites requesting 214,360 requests of information from 1,290 distinct files for an average of 2,392 requests per day. These visitors transferred 92,664 pages representing more than 3.7 terabytes of data. Each day detailed statistics on access to the server are updated and summaries are available for viewing on the server.

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

1. Science Education program information and status reports
2. Science at Home
3. NM On-line Internet Institute (OII)
4. NTEP National Teacher Enhancement Program
5. Hydrogen Conference
6. Science Education Program Status Reports
7. New Mexico Supercomputing Challenge Program
8. Critical Issues Forum Program

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

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

## **The Hydrogen Project**

*Marcia Zalbowitz, STB/EOP*

Proceedings from the conference *Hydrogen and the Materials of a Sustainable Energy Future* have been published and distributed. This conference was held at Los Alamos on October 28-30, 1996. In addition to the papers presented at the conference, the proceedings contain a general overview on hydrogen. Also included is a section providing numerous supplemental resources such as a curriculum outline, bibliography and related Internet addresses.

As a part of the National Hydrogen Association annual meeting, the Hydrogen Project in conjunction with MST-11, was invited to make a presentation to a group of Washington, DC, area high school students. The small solar/hydrogen energy prototype kit and a radio controlled fuel cell powered vehicle developed and built at LANL were demonstrated. This educational kit, utilizing a water electrolyser powered by photovoltaic cells demonstrates hydrogen production and storage. When coupled with a small, radio controlled vehicle powered by an air breathing polymer electrolyte membrane (PEM) fuel cell, the system demonstrates the utilization of renewable hydrogen. This activity was also presented in a formal poster session during the conference. There was an enthusiastic response from students and professionals.

The Hydrogen Project has been actively engaged in program development. We are seeking funding to implement two proposed educational activities for high school students. We have created a structure for a hydrogen curriculum and additional educational activities for high school students. We have also written a proposal for a student vehicle competition (small, radio controlled vehicles) utilizing renewably

produced hydrogen as the fuel and fuel cells as the vehicular power source. (this is based on technology developed at MST-11)

*Make Your Own Energy* is a proposal for a high school curriculum. LANL will develop a curriculum module on hydrogen technology and renewable resources for high school students. Although hydrogen is included in high school science curricula, its potential as a longer-term alternative fuel is often relegated to limited discussion. Information about fuel cells and other emerging energy technologies is minimal -- often found in brief paragraphs at the end of a chapter or in the "learn more about it" section. The proposed curriculum will provide students with the opportunity to learn about energy technologies and participate in laboratory based activities that highlight hydrogen as the fuel of the future. We will also utilize our world-wide-web activities such as homepages and Internet conferencing, and expand written materials already developed by the Hydrogen Project. The module will be a multi-week activity that will give students a variety of resources and information about hydrogen and renewable energy systems. A module production team will be created utilizing members of LANL staff as well as a curriculum developer and high school teachers. Additional team members could come from industry, academia and/or other national laboratories. Implementation of this activity will involve module development, design, evaluation, testing and distribution. It is our intention to create an attractive educational tool for science educators -- going beyond the fundamentals of hydrogen. The intriguing elements of materials and chemistry will be combined into high quality demonstrations and laboratory activities to make this a valuable addition to the way science is currently taught.

*Make Your Own Fuel/Drive Your Own Car* is a proposal for a student competition. The unique premise of this new competition will be the generation and storage of hydrogen fuel as well as the construction of a hydrogen-fueled radio-controlled vehicle by teams of students. Students will not only build the fuel cell powered small vehicle, but they will also build the system that will supply the hydrogen fuel. The structure of the competition will, in part, be modeled after similar educational activities sponsored by the Office of Transportation Technologies at DOE. Each competing team could be given solar cells, a hydride storage cylinder and/or a fuel cell. During the development phase of this project, competition guidelines and regulations along with instructional/educational materials and information about handling hydrogen safely will be prepared. Some of these materials will come from activities already completed by the Hydrogen Project and the proposed curriculum. As with other competitions, each team will have a "mentor" or technical supervisor such as a LANL staff member or an appropriate expert from research or industry. A competition planning group will be made up of teachers, LANL staff, liaisons from DOE, industry, and appropriate other representatives. This project will begin with a small number of teams (3-4) in order to carefully develop and grow the foundation, regulations, guidelines and cooperative relationships necessary for a larger, nationally based activity.

## **Practical Applications for Young Science Communicators (PAYS)**

*Mark Muller, STB/SE*

PAYS, a program for high school students, 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 cutting-edge science into understandable terms. 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 project objectives include:

- enhancing students' communication skills in science;
- increasing students' knowledge of Laboratory science;
- increasing students' knowledge of science communication careers;
- increasing students' understanding of-and experience in-designing effective multi-media science communication products, and
- improving participants' ability to work in diverse, productive teams.

PAYS applications were mailed to all area high schools, and site visits were completed in early April.