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**TITLE:** Los Alamos National Laboratory Science Education Programs Progress Report, October 1, 1994 - December 31, 1994

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**SUBMITTED TO:** Distribution

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

**October 1, 1994 - December 31, 1994**

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Retta - what about eliminating the dots and page numbers  
for the major headings? Cleaner look?

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## **TEACHER/FACULTY ENHANCEMENT**

### **National Teacher Enhancement Program (NTEP)**

During the 1994 summer institute NTEP teachers worked in coordination with LANL and the Los Alamos Middle School and Mountain Elementary School to gain experience in communicating on-line, to gain further information from the Internet and in using electronic Bulletin Board Systems (BBSs) to exchange ideas with other teachers.

To build on their telecommunications skills, NTEP teachers participated in the International Telecommunications in Education Conference (Tel\*ED '94) at the Albuquerque Convention Center on November 11 & 12, 1994. They attended the multimedia keynote address, various workshops highlighting many aspects of educational telecommunications skills, and the Telecomm Rodeo sponsored by Los Alamos National Laboratory. The Rodeo featured many presentations by Laboratory personnel and educational institutions on ways in which telecommunications technologies can be used in the classroom. Many were of the "hands-on" type, so that teachers were able to try out methods and equipment and evaluate their usefulness in their own schools and classrooms. Some of the presentations featured were the Geonet educational BBS system, the Supercomputing Challenge, and the Sunrise Project, all sponsored by LANL; the "CU-seeMe" live video software, various simulation software packages, networking help, and many other interesting and useful exhibits.

NTEP staff mailed out materials to participants including: a newsletter from the New Mexico Council of Computer Users in Education, a sample evaluation portfolio workbook, information about an on-line class on systemic change, information about available technology grants, and various articles about effective math and science teaching methods.

NTEP coordinators and lead teachers made plans to attend an evaluation training session with national program coordinators, and continued planning the Spring workshop, which will feature grant-writing, partnership-building, Geonet BBS exercises, and an introduction to the summer life sciences institute.

### **Science Teacher Enhancement Program (STEP)**

#### *Science Teacher Enhancement Program's*

The Summer Teacher Institute is a National Science and Technology Council (NSTC)-funded DOE-coordinated program for high school math, science, computer technology teachers and administrators in the Rio Grande watershed region. The program is designed to bring teams of teachers and administrators together to develop an interdisciplinary instructional approach focusing on water quality in the Rio Grande watershed. The goal of the Institute is to provide an interdisciplinary instructional model for science and mathematics, with a focus on the study of water quality in the Rio Grande watershed, that will change the nature of high school science classroom teaching and learning. The program consists of one four-week Summer Institute, followed by three two-day academic year workshops as well as three school site visits by the program coordinator.

There were two major accomplishments during this quarter: (1) All participating schools were visited by the program coordinator, and; (2) the first follow-up workshop was held for program participants.

### School Site Visits

All schools were visited during this quarter. The purpose of this visit was to (1) meet with the school administration; (2) meet with colleagues of Summer Teacher Institute participants who have become involved in the implementation of the instructional program developed at the Summer Teacher Institute; (3) provide feedback on Implementation Plans; (4) deliver modems and facilitate telecommunications hardware connections; (5) deliver an assigned EcoNet account to each school; (6) provide on-site training in EcoNet/SalsaNet/GEONet/TechNet, and; (7) answer additional questions.

While some programs have yet to "get off the ground" (understandably so, given the various timetables chosen for implementation), many notable achievements were observed during these site visits. Among them:

- Duane Dill and Joy Tratechaud of Laguna-Acoma High School have persuaded their school's administration to bring phone lines into their classrooms. They will be the first people in the history of the school to go "on line!" Duane and Joy have also already taken their students on two water quality assessment field trips, in one case finding high fecal coliform levels, which Joy is planning on investigating further with a group of her Environmental Science students.
- Lupe Briones, Tawfig Attar, and Debbie Benslimane at San Elizario High School made a presentation about their experiences at the Summer Teacher Institute and their proposed program to their colleagues and received an enthusiastic response! Also, the team arranged for the Summer Teacher Institute program coordinator to meet with the district Superintendent. At that meeting Lupe presented, on behalf of the team, their proposed program to the Superintendent, the district Chapter One coordinator, and the district Information Specialist securing full support for their program.
- Dick Powell of Los Alamos High School has enlisted the help of two of his colleagues at the school to join his implementation team. Dick will take the lead in "training" these new recruits in water quality testing methodology and will coordinate the team's sampling and monitoring efforts throughout the upcoming year.

### First Follow-up Workshop

Three program follow-up workshops have been scheduled. These workshops are designed to: (a) review and enhance both content and process skills covered at the Institute; (b) introduce new content relative to all teachers, and; (c) promote continued networking and resource sharing among participants and with the laboratory. The first follow-up workshop, held in El Paso, Texas, touched on all three areas. Among the highlights of the workshop:

- A tour of Juarez, Mexico, focusing on water management and water quality issues;
- A tour of a Maquilladores plant in Juarez;
- A session by Dick Powell on Quality Assurance/Quality Control (QA/QC) of data collection;

- A session on how to use the EcoNet computer network.

In addition, fifteen minutes were scheduled for each team to present an update of program implementation progress-to-date to the group. Included in each presentation was: (1) An overview of program implementation progress to date; (2) Presentations delivered to colleagues, school administration, and/or parents and community members regarding the program; (3) Information about parents and/or other teachers who have been 'recruited' to join in individual program implementation; (4) Program implementation hurdles; and; (5) Program implementation success stories.

Highlights of program reports, (in addition to the results reported above), included a video of a recent water quality monitoring trip taken by Peter Graham's class at Santa Fe High School and a slide presentation by Duane Dill of Laguna-Acoma school district of several trips to the river by Duane and Joy Tratechaud's students.

The second follow-up workshop is scheduled for January 19th-20th at Los Alamos National Laboratory.

### **Science Outreach;**

The Science Outreach Program supports the efforts of the New Mexico Systemic Initiative in Math and Science Education (SIMSE) to improve science, mathematics, and technology education through comprehensive systemic change. In its second year, this program provides assistance by connecting the resources of the Laboratory to teacher teams at five SIMSE hub schools throughout Northern New Mexico in developing and implementing their technology plans. The SIMSE hub schools are distributed geographically so that they may in turn reach out and provide outreach for other schools in their area thus covering northern New Mexico. Science Outreach supports local efforts to promote systemic change at schools by providing a number of services that SIMSE teachers can use to help them enhance their instructional effectiveness.

Examples of some of the kinds of outreach assistance that SIMSE hub schools receive are :

- workshops for teachers, administrators, and parents on how to use technology in the classroom to improve student learning and to share science education information and pedagogy;
- information on alternative assessment and ways to use it appropriately;
- assistance in incorporating educational technology into a lesson or unit;
- information and materials on a specific topic;
- assist teachers in developing and implementing lessons and activities which support Project 2061 objectives and goals; and
- assistance with networking the hub school to the Internet to provide a means of communication with other hub schools and the scientists, engineers, and technicians at the Los Alamos National Laboratory.

Hub schools have started to outreach to other schools in their area and have provided workshops to these schools during inservices based on equipment, materials, and information they have received from Science Outreach. In this manner more schools may receive outreach while the hub schools become strong leaders in educational technology in their district. Other SIMSE schools will become hub schools in the future so that more schools may receive outreach.

The Computing, Information, and Communications Division, CIC-5, is partnering with HR/SEO to provide the hub schools with expertise and experience to develop and document feasible and validated models of school networking building upon both school resources and national laboratory resources

### **Teacher Research Associates (TRAC)**

The mentor recruitment went well. We received 23 research proposals for 15 funded slots. The LANL coordinator attended the TRAC draft and meeting in Washington in mid December. At that time, it was announced that funding was down and we had to cut back to 11 funded national slots. We were able to select either first or second choice applicants for the selected research positions for the summer 1995 TRAC program. One of the 1994 TRAC participants, Yvonne Zenga from Española, was selected to participate in the Partners in Science Conference, held annually in Tucson, AZ. She will present her poster session at the end of January. Yvonne's mentor was Jim Freyer of LS-1. Her research encompassed an in-depth study of tumor cells.

~~In addition~~, Dick Chapleau, a 1994 TRAC participant from California, was selected as Teacher of the Year in California. He will go on to the national Teacher of the Year conference in January. Dick's mentor was Aaron Koskelo of CST-1. His research was in the area of spectroscopy and the study of elements within contaminated soils. Dick was featured in an article within the December 2, 1994 issue of the Los Alamos News Bulletin.

At this time, the offer letters to the 1995 TRAC participants are about to be sent out by the Associated Western Universities in Salt Lake City, UT. The LANL-TRAC program has been selected for a more in-depth study as part of the Multi-Agency Study of Best Practices in Teacher Enhancement. Specific criteria were used in determining which programs out of 35 evaluated represented best of practice. Only 12 programs were selected and the LANL-TRAC program was selected for a more in-depth study. During the summer 1994 TRAC program, the LANL-TRAC was evaluated by WESTAT (a research corporation) for best of practice. The LANL-TRAC program will continue to be studied throughout the summer 1995 session by WESTAT.

### **Teacher Opportunities to Promote Science (TOPS)**

~~and~~ LANL coordinated with Sandia National Laboratories TOPS staff to produce a recruitment packet for the third cohort of TOPS teachers. Packets were mailed to rural middle school math, science and technology teachers and their administrators. The mailing was followed-up by site recruiting visits in areas not currently represented in TOPS.

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Site visits were made to observe event-based science units teachers developed during the summer institute. Visits also served to introduce school administrators to the LANL scientist who will be working with the TOPS Mentor Program and familiarize the scientist with the remote rural communities TOPS serves.

A TOPS workshop was conducted November 10-12, 1994, in conjunction with the Tel\*Ed '94 Conference in Albuquerque. The first day of the workshop was a presentation on grant writing by Dr. Halverson of Southwest Educational Development Laboratory (SEDL). Teachers then attended regular conference presentations. Several TOPS teachers, along with their student representatives, helped demonstrate the GeoNet bulletin board and its use with the Davis weather stations used during the "Ring of Light Eclipse" project. The demonstration was part of the Multi-Media Rodeo sponsored by LANL.

A TOPS Advisory Committee meeting was held in Los Alamos on December 7, 1994. TOPS teachers presented the accomplishments of the second cohort and members were updated on plans for the third cohort, GeoNet projects, and the TOPS Mentor Program. The advisory meeting was followed by a TOPS workshop on December 8-9. Dr. John Grazzi, Dr. Lawrence Martel, and Mr. Leo Wood led the presentation on Integrated Learning and Instructional Design.

The GeoNet electronic bulletin board project was demonstrated at DOE's Director's Meeting on December 12, 1994. The demonstration showcased the various uses of the board by TOPS teachers, students, and LANL staff for networking and data collection.

### National Geographic Kids Network

We have begun conducting site visits to participating school teams. Visits are scheduled to coincide with their on-line segment of the NGS Kids Network curriculum. At this point less than half of the participants have conducted the NGS units. Most will participate in the February - April "Weather in Action" team project. Additional visits were scheduled upon request to provide technical assistance or to meet with administration and staff.

We have logged all NGS participants onto the GeoNet bulletin board. The board is being used for technical support through LANL technical staff, NGS related announcements, and sharing of teacher designed activities.

LANL co-sponsored a demonstration with Sandia National Laboratories (SNL) NGS participants at the November 11-12, 1995 LANL Multi-Media Rodeo in conjunction with the Tel\*Ed '94 Conference in Albuquerque. *TeleComm*

We began compiling the first issue of the New Mexico NGS Kids Network support group newsletter to be distributed in January, 1995. Future issues will be a collaboration of LANL and SNL NGS programs.

### TOPS Mentor Program

~~(Rec'd this version first - placed RTF version rec'd 1/26 following this one)~~

~~Compiled recruitment materials including program description, tentative timeline, and application forms. Conducted a work session which included the TOPS coordinators~~

from Sandia and Los Alamos and the Los Alamos scientist who will be conducting the weather experiments with the TOPS mentors and the new TOPS cohort.

Presented an overview of the TOPS Mentor Program at the TOPS workshop in Albuquerque on November 10, 1995, and distributed application packets to the current TOPS cohort. Mailed application packets out to the first cohort of TOPS teachers.

Presented an overview of the TOPS Mentor Program to the TOPS Advisory Committee meeting in Los Alamos on December 7, 1994. Solicited feedback on the program from the advisors.

Made site visits for recruiting in conjunction with regular TOPS visits to the present cohort. Visited with administrators and eligible teachers about the mentor program.

Applications for the TOPS Mentor Program are due January 6, 1995.

#### RTF Version)

An application for the TOPS Mentor Program were mailed to TOPS alumni of the first cohort of both LANL and SNL TOPS programs (applications due January 6, 1995). Follow-up site recruitment visits were scheduled upon request of the applicant or administrator. Applications were distributed to the current TOPS cohort at the November 10-12, 1994, TOPS workshop in Albuquerque.

Long-range plans for the Mentor program were developed at a December 2, 1994, meeting with LANL Mentor program scientists and SNL TOPS program coordinator. A tentative calendar was set and advisory committee members were selected to represent the Mentor program on the regular TOPS Advisory Committee. A planning retreat was scheduled for January 1995.

The TOPS advisory committee was briefed on the Mentor program at the December 7, 1994, meeting in Los Alamos. New advisory committee members representing the Mentor program were introduced to the original committee. Plans for the TOPS Mentor program were presented and feedback was solicited.

## CURRICULUM IMPROVEMENT

### MegaMath

*Education Director's Conference*

The second version of the MegaMath Internet Workbook, located on the World Wide Web at <http://www.c3.lanl.gov/mega-math> has been successfully demonstrated at Tel-Ed '94 Albuquerque, and the DOE Director of Science Education Marketplace of Ideas. The live workbook is receiving a lot of attention and has been written up in the national NetTeach News, a weekly periodical devoted to Internet educational software. The workbook was also shown to the Public Broadcasting System (PBS) in Washington, D.C. and EnterLearn, an educational technology development company. We are jointly exploring the possibility of producing MegaMath based educational software.

~~The~~ New Mexico Highlands University, Las Vegas, NM, is within weeks of completing the first version of the prototype video game, Universal Connection. This is a video game

based on the Minimum spanning tree algorithm which is a standard MegaMath paradigm. The game is done with state-of-the-art computer graphics and sound. We hope to explore our contact with EnterLearn to display and popularize this game. Estimated date of completion is March, 1995.

We are underway in a major goal for this fiscal year, which is to produce a new MegaMath workbook written for children. The original workbook is directed at teachers, and we have identified a need in the market for this idea. Los Alamos has been invited to several conferences and meeting to publicize and popularize MegaMath. This includes speaking engagements at Augsburg College, in Minneapolis, and the University of Idaho.

## INSTITUTIONAL IMPROVEMENT

### **Pre-Service Institute for Science and Math (PRISM)**

The PRISM students met once each week during the fall semester with the coordinator as part of a one-credit general studies class at UNM-LA. The class offered a regular forum for student progress reports, student issues and concerns, technical presentations by Laboratory staff, persistence strategy discussions and strategic planning.

Presentations by Laboratory scientists or University technical faculty continue to be a valuable and important persistence strategy for the PRISM students. Participant feedback is positive for presentations at appropriate technical levels. There were three presentations during the semester. Rod Whitaker (EES-5) explained the theory of the infra-sound detector array used to help monitor the comprehensive test-ban treaty. He presented data characterizing earthquakes, aurora borealis, and conventional explosions and invited the class to visit the detector site at a later date. Don Rej (DDP) described plasma physics research projects, explained the underlying physics, and emphasized the importance of the different types of support people required to make this research viable. Ian Abbey (Northern New Mexico Community College) reported on the progress his students were making toward designing and building a solar-powered race car for the DOE Solar Race scheduled for Summer 1995. He presented a mathematical description of all the important design factors and allowed the students to test the motorless prototype.

#### *TELXEO94 Tele Comm Rodeo*

The students were provided tutorial assistance either through the UNM-LA tutoring service or through voluntary SERS students who also acted as mentors. PRISM students were invited to attend a variety of activities such as a PC:Solve workshop, a trip to Bandelier with SERS students, the ~~TEL-COM~~ '94 workshop, Bradbury Science Museum events, Pajarito Astronomers activities, etc. Each student was given an e-mail account at UNM-LA to improve and enhance communication. Students scheduled a private meeting with the program coordinator using electronic mail.

Recruitment activities for the next cohort (Summer 1995) were coordinated with the UNM-LA recruiter. A recruitment brochure was created and personally distributed to interested students at a dozen area schools. Contacts were made at UNM main campus to formalize follow-up assistance for PRISM participants who transfer to the main campus. A student-progress evaluation template was developed to help assess the effectiveness of persistence strategies. An assessment instrument for the tutoring activities was created and field tested. Significant progress was made toward developing an independent student research course for technical credit at UNM-LA.

## **SIMSE Support**

The Systemic Initiative in Math and Science Education (SIMSE) recently submitted a midpoint report to the National Science Foundation. We also presented a review of our first two-and-a-half years to an NSF panel in Washington. Preparation for this critical midpoint milestone consumed SIMSE staff and PIs throughout most of November, December, and early January. The report and presentation were well received; however, NSF staffers have informally suggested that SIMSE must address a few problem areas. Though still awaiting formal communication in response to our report and presentation, we are preparing for a March site visit by the NSF panel. The panel will review SIMSE and recommend whether to continue or discontinue funding. Meanwhile, plans are proceeding to add 30 more schools to SIMSE and to conduct three, three-week summer institutes for SIMSE school staff. The Laboratory continues to contribute time to this initiative and coordinates educational outreach with SIMSE schools in Northern New Mexico.

## **STUDENT SUPPORT**

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

SAGE faculty members met for their semi-annual two-day workshop to debrief from SAGE 1994 and to plan for upcoming activities. Planned for early 1995 is a 4 day workshop at the University of Texas (El Paso) for selected SAGE 1994 students who were supported by the NSF Research Experiences for Undergraduates (REU) program. The workshop, which will be supported by NSF funds, is designed to allow undergraduate students to continue their research training. These students will participate in additional processing and interpretation of seismic data that they themselves helped to acquire during last summer's program.

We provided certificates and grades to students who required college credit from SAGE 1994. We worked with the Laboratory's Science Education Outreach Group to place a TRAC teacher into SAGE 1995. A high-school teacher with an educational background in science and math, and strong interest and experience in earth science, has been selected to participate in SAGE 1995. Our goal, which has been discussed already with the teacher, is to encourage integration of some aspect of the SAGE experience into her regular teaching curriculum. Participation by a high-school teacher represents an experiment by all of us, and if successful, will be continued in future years.

Baldridge and Ferguson began field reconnaissance and permitting activities in preparation for SAGE 1995. Full compliance with the National Environmental Policy Act (NEPA) is required for SAGE's field activities.

A peer-reviewed journal article has been published in the Geological Society of America Bulletin, summarizing results of seismic work conducted by SAGE 1990 and SAGE 1991. Included among the authors of the paper are three former SAGE students.

## **Exploring Science Careers**

Exploring Science Careers is an after-school, academic-year program which brings 9-10 grade high school students from area schools to the Los Alamos National Laboratory two afternoons per week. Career modules in engineering, computer science, communication skills, and applied technologies included presentations by Laboratory personnel, tours of Laboratory facilities, and planning sessions that lead students through critical thinking, decision making formats that can help them prepare strong academic programs for their remaining high school experiences.

The current Exploring Science Careers program has 24 participants from Los Alamos, Española, Mesa Vista, Santa Fe, Pojoaque, and Taos. Marty Shipley, LANL engineer, has been instrumental in helping the students with program activities and projects. The program will culminate in a sprint solar car competition at the end of January where Laboratory engineers will work with the students to design and construct their solar cars. Students are currently working with solar car software to learn about various design strategies. A tour of the advanced computer lab is scheduled to complete the module on computer science.

The final awards ceremony will be held at the beginning of February for the current group of Exploring Science Careers participants. The next group will begin the program with National Engineers Week, February 19-25, 1995. Engineers from the Laboratory will provide students with career information about engineering and guide them through hands-on engineering activities such as taking apart a computer.

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

Project SEED offers qualified students meaningful scientific activities under the supervision of Laboratory research staff. The program is open to students of economically disadvantaged families from Northern New Mexico. The primary objectives are the following:

- to encourage participants to pursue strong academic programs and to more fully develop individual career potential;
- to prepare participants for entrance into professional careers by providing students with work experience within a professional setting;
- to encourage a more serious consideration of scientific careers;
- to enhance each participant's self-confidence and ability to work effectively with research equipment, concepts, and scientific professionals.

Participants spend 80 percent of their time with a mentor, and 20 percent of their time participating in special activities including seminars and workshops in problem solving and critical thinking, college financial aid and career counseling, and technical communications. In addition, students participate in site tours to learn about basic research at the Laboratory, and present a paper and poster on their research.

To date, the recruitment proceedings have just begun and mentors are being contacted. Packets for recruitment are being readied for target schools, and the Science Education & Outreach Group has begun the process of recruiting students as outlined by the American Chemical Society. The program ~~will begin in June and run from June 12 to~~ August 18, 1995.

### **Students Examining Issues in Science, Technology and Society**

The SEIS<sup>TS</sup> program is currently under development. It is a six-week summer institute for high school juniors and seniors. Research was conducted to determine an appropriate topic that reflects Laboratory initiatives and resources as well as one that addresses the interests and science content needs of high school students. The topic selected, the production and storage of tritium, represents the research focus for the laboratory. A scenario is being developed that will involve the students in active participation in a "town hall meeting". The scenario will include laboratory personnel, community personnel, regional and state personnel. Scientists involved in tritium research, production, storage, safety, and training are being contacted for their participation in various components of the project. The institute will be held from June 19, 1995 through July 28, 1995. Informational flyers, application forms and reference forms have been developed and printed.

The following will occur during the 1st quarter of 1995:

- Criteria for participant selection will be developed.
- Recruitment of Laboratory scientists.
- Recruitment of community, regional, and state personnel.
- Disseminate information packets to schools.
- Continue work on scenario development.

### **High School Critical Issues Forum**

The 1995 High School Forum on Critical Issues focuses on students' abilities to develop and examine the personal connections of Northern New Mexicans to the Rainforest areas in Central and South America. This topic was chosen in order to engage students and teachers in an interdisciplinary area of study that allows scientists at Los Alamos National Laboratory to interact with schools throughout the target area. The goal of the forum is to allow participants to become engaged in a scientific process that centers on real world issues and problems. Students work in collaborative teams and share information with others through an electronic bulletin board. If they are unable to post the information directly, the program coordinator can do this at LANL. The program has also enlisted the University of New Mexico as a partner and resource center.

Announcements were sent to schools throughout Northern New Mexico, and 22 teams representing 15 high schools responded to the invitation to participate. Each team may be comprised of 3-5 students and a teacher/coach. One additional team from a given school was allowed to participate provided that a teacher/coach could be found for each group of students. No school can enter more than two teams.

The research teams have an opportunity to identify the connections that bind high school students in Northern New Mexico to a rainforest in Costa Rica. To insure parity among

participants, an electronic bulletin board is provided through GEO-Net, and this now becomes a central location for interaction and collaboration. Through the bulletin board, participants can access each other, Laboratory technical staff (mentors), and university staff as resources. As "teleconnections" grow, users can extend their scope of contact to include organizations and resources throughout the world.

An introductory workshop designed to assist teachers in guiding their teams was held at Los Alamos National Laboratory on December 2, 1994. The program description, complex problem analysis, and related important topics were discussed in the morning session. In the afternoon, team procedures and evaluation criteria were outlined along with a demonstration of the GEO-Net Bulletin Board. Teachers seemed enthusiastic about the topic and eager to engage their students in the Forum.

The Science Education and Outreach Group had hoped to gift computers directly to the participating schools, and all paperwork associated with this procedure was collected on December 2, 1994. Since a DOE order had shut down all gifting of equipment until further notice, teams were not given computers at this time. The order has since been lifted and computers can be made available to the participating teams, therefore a site visit by the Program Coordinator will be required to install and enable the telecommunications system.

An initial mailing of resources to schools was sent on December 13, 1992 which included the 1994-95 World Resources, various articles about the rainforest, and procedures for posting information. Participants can fax, mail or electronically post information as they gather it.

## New Mexico Supercomputing Challenge

*The Challenge is*

An academic-year-long program in which teams of high school students and their sponsoring teachers work on computational science projects using high performance computers. The NM Supercomputing Challenge is a collaborative effort sponsored by universities, the national laboratories, and corporations in New Mexico. As one of the primary sponsors of the ~~New Mexico High School Supercomputing~~ Challenge, LANL has provided supercomputing accounts, consulting, advisors, awards, activities, evaluation coordination, and the educational design and coordination for this program since its inception in 1990. In support of national Challenge initiatives, LANL is offering to help other states interested in promoting state Challenges explore this possibility by providing education program consulting, materials, data, experience, and instruction assistance.

The fifth New Mexico Supercomputing Challenge is well underway. It started with the Kickoff Conference held at the Glorieta Conference Center in late October. An impressive training staff, presented four days of sessions for 175 teams - 591 students and 125 teachers from 55 schools in 43 communities throughout New Mexico. Approximately 36% of the students have participated before and are returning to participate in their second or third year of the Challenge.

## School Visits and Regional Workshops

Personnel from LANL and other sponsors' representatives completed school visits to follow-up with Challenge teams, assure that teams had access, determine needs, and

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troubleshoot problems at school sites. Plans have been completed for six regional workshops to be held at universities and colleges around the state in January. ~~David~~ will be coordinating the training sessions for the regionals with John Jenkins, New Mexico Technet.

#### New Challenge Initiative

A summer workshop for Challenge teachers will be held in Los Alamos in August. Announcements have been sent to teachers. We have been very busy designing the workshop and getting preliminary arrangements underway.

#### Conferences and Presentations

- Telecommunications in Education (Tel\*Ed) Conference, Albuquerque, November 1994.
- Supercomputing '94, Washington D.C., Education Exhibits, November 1994.
- DOE Education Directors' Meeting, Marketplace of Ideas, Washington, D.C., December 1994.

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

HBCU activity during this period included: (1) processing of student applications for summer internships, (2) processing several contracts, in support of collaborative research efforts involving LANL and several HBCU institutions, and (3) attending a meeting of HBCU Coordinators, DOE-Wide, in Washington, D.C. on December 14, 1994.

#### Underrepresented Minority/Female Initiative

We currently have three Graduate Research Assistants (GRA) on board with two additional GRA students coming after the first of the year. Three of the five GRA students will be on a 50/50 salary cost share basis with their host technical organization and the URM/F program.

Recruitment of summer (1995) UGS and GRA students has been completed at the University of Texas-El Paso (UTEP), New Mexico State University (NMSU), New Mexico Institute of Mining and Technology (NMIMT), and the University of New Mexico (UNM).

We are now working on a project that will bring 20 high school graduates to the University of New Mexico-Los Alamos this summer (1995) for an eight week summer institute.

We have met with the NMSU NSF/Alliance for Minority Participation people to discuss plans for this summer's (1995) internships at NMSU. There will be between five and eight internships.

We supported LANL Native Americans in several recruiting and conference initiatives. They will submit names and information needed for possible summer internships.

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

This quarter [October 1 - December 31, 1994] marks our initial recruiting phase for the Summer session of 1995. Color posters have been produced and sent to Departments of Physics and Societies of Physics Students (SPS) at most universities and colleges within the United States. The Societies represent organizations of undergraduate physics majors under the aegis of the local university department. This mailing covers hundreds of institutions. In addition, a flier was also produced and distributed to members of the Division of Atomic, Molecular, and Optical Physics of the American Physical Society, reaching thousands of interested scientists. The primary responsibility for this stage rests with the Center for Graduate Studies at the University of New Mexico in Santa Fe that has trained staff in such matters. The deadline for submitting applications is February 1, 1995. At the same time, planning for the 1995 session has begun with housing requests, invitations to guest lecturers, and mentoring recruitment. Many of the past undergraduate students have requested letters of recommendation to graduate schools from lecturers and mentors in the program.

We have received preliminary notification from the National Science Foundation that the Research Experience for Undergraduates (REU) site grant has been recommended for an additional three years [FY95-FY97] at the level of \$50,000 per year.

## **Science Engineering Research Semester (SERS)**

The Fall, 1994 SERS group consisted of 27 students. Two of the students were funded by research groups. All of the ~~six~~ visits were completed in October. There were many supplementary education activities planned for the students during this quarter. They included the following: geology field trip from Los Alamos to the Harding Mine (near Dixon, NM), LAMPF and LANSCE tour, update on HIV research, and an ALEXIS satellite project presentation. We also held a student and mentor potluck, toured three laser facilities, viewed and discussed the movie "Silkwood", had a two part "technical talk" workshop for two consecutive Wednesdays, a discussion of Dimensional Analysis, and concluded the semester with the SERS poster session.

This year the poster session was held at the Bradbury Science Museum. I feel that this location was the best yet. The museum offers a wonderfully conducive atmosphere for presenting the results of the student research. Approximately 150 people were in attendance. Frances Menlove presented the students with their Certificates of Achievement. The mentor appreciation dinner was held at Rancho de Chimayo with a great turnout. Approximately six students have returned for an extended stay (graduated seniors) either with the same mentor or a new group and mentor. The LANL coordinator attended the SERS Executive Committee meeting in Washington, D.C., in mid-December. The Spring 1995 SERS students were selected during December and 24 new students will arrive January 17, 1995.

We had an incredible number of research proposals arrive prior to the SERS student selection. Typically 25-30 proposals arrive for review, <sup>However,</sup> for the spring semester we received 55 proposals for 25 funded positions. Based upon evaluation results, the overall success of the SERS program the past several semesters has demonstrated what a quality program it is. More importantly, the caliber of students has been quite good as well. The LANL scientists recognize the usefulness and importance of this

educational program. This has been demonstrated by the increase in research proposals and by the number of new mentors willing to become involved in the SERS program. We received 110 student applications for review which was down by 10% from past semesters. The overall number of applicants to the national program was about the same. As in the last two SERS sessions, several students functioned as tutors for the PRISM students. In addition, several SERS chemistry students participated in Exploring Science Careers during Chemistry Week. This collaborative effort between programs has been beneficial to all the participants. A new SERS profiling template is close to completion and will be implemented during the spring 1995 semester.

### *ce Communications (PAYS)* **Practical Applications for Young Scientists (PAYS)**

A publication describing the 1994 PAYS students' museum exhibit, "Living with Radiation," was published. The distribution will include the program participants, LANL staff who assisted in PAYS, and other interested people throughout the DOE complex. In addition, copies will be made available to the public through the Bradbury Science Museum, home of the exhibit.

### **Science and Technology Alliance**

Science and Technology Alliance activity during this period included: (1) student recruitment at New Mexico Highlands University on October 14, 1994, (2) student recruitment at all four Montana Consortium schools October 16-21, 1994, (3) student recruitment at Ana G. Mendez University System on October 27-28, 1994, and (4) Science and Technology Alliance Steering Committee Meeting, December 15-16, 1994, in Washington D.C.. In addition to these activities we did recruit at North Carolina A&T State University on September 23, 1994.

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

There are two research contracts being formalized with two of the regional two-year institutions, along with other proposals being considered from other two-year schools. These contracts are:

- Northern New Mexico Community College (*Pemphigus vulgaris* – DNA sequencing)
- Navajo Community College (GIS transportation costs of solid waste and recycled materials from various chapters on the Navajo Nation)

The Science and Technology Base (STB) and Materials Science and Technology (MST) Divisions have signed a "Memorandum of Intent (MOI)", along with Albuquerque Technical Vocational Institute (TVI) and the Intel Corporation. The MOI is intended to articulate with TVI and other regional two-year institutions in the training and education of microelectronics technicians that will make use of the LANL Advanced Materials Laboratory (AML) clean room facility. The two-year initiative program will have three or four part-time undergraduate students from TVI and Southwest Indian Polytechnic Institute (SIPI) working at the AML facility with a Los Alamos mentor.

Northern New Mexico Community College and Luna Vocational Technical Institute are scheduled to implement a similar curricula this spring. Santa Fe Community College is scheduled to start next fall. *um*

Plans are underway to bring eleven student/faculty teams for summer of 1995 internships. Seven teams will be involved in environmental restoration/waste management programs, and four teams will work on advanced manufacturing technology programs.

We are continuing to develop the NSF/ATE final proposal. The due date is January 31, 1995.

We are coordinating a meeting with LANL people and others to discuss the potential of drafting an ARPA TRP proposal for Advanced Manufacturing and Education.

### International Science Partners

*(ORISE)*  
The International Science Partners Program was developed by Los Alamos and Livermore National Laboratories, in partnership with the Oak Ridge Institute for Science Education and with the Global Rivers Environmental Education Network (GREEN). The program is an international science education program for high school students and teachers. It offers teachers and students an opportunity to work together and with Laboratory scientists on examining complex global science issues. The goal of the program is to provide academic challenge in the spirit of international scientific cooperation, that will enhance participants' understanding of significant global issues that involve science, technology, and society.

Effort on the International Science Partners Program during this quarter focused on three areas in particular: (1) The planning/implementation of the program's first follow-up workshop; (2) The establishment of a programmatic relationship with scientists and teachers from Arzamas-16, Russia; and (3) The development of guidelines for—and initiating participant participation in the development of—the program's culminating event, a Student Research Summit.

#### Follow-Up Workshop

A follow-up workshop was held at Livermore National Laboratory December 19th-20th.

*pm.* The workshop accomplished several objectives. The workshop: (1) Reconnected partners with one another and provided an opportunity for them to re-visit their implementation plans; (2) Provided an opportunity for participants to share program successes and struggles; (3) Presented participants with a model of how to lead students through the process of conducting scientific research in the area of water quality; (4) Provided participants with additional training and time for practice on the EcoNet computer network; and, (5) Allowed for the planning of the end-of-the year Student Research Summit.

#### Establishment of a Programmatic Relationship With Arzamas-16

Three individuals from Arzamas-16, Russia were invited to participate as points of contact for the International Science Partners Program. Attending the workshop held in Livermore were: (1) Dr. Igor Pavlovich Borin, head of laboratory, Ph.D in physical-mathematical sciences, senior scientist in theoretical and mathematical physics,

Arzamas-16; (2) Dr. Vladimir Nikolaevich Popov, head of laboratory, Ph.D in technical sciences, senior scientist in analytical chemistry, Arzamas-16; and, (3) Ludmila Nikolaevna Nazarova, principal of School #2, Arzamas, Russia.

As scientific and technical resources for the program, Dr. Borin and Dr. Popov will, upon returning to Russia, provide technical assistance to the principal of School #2, Ludmila Nazarova, and the teachers and students from the school participating in the program in implementing this project throughout the 1995-96 academic year.

As point of contact for the program, Ludmila Nazarova will identify and select two teachers from schools in Arzamas to participate in the program. She will begin working with these teachers to prepare them for the 1995-96 academic year program. These teachers will be invited to participate in Los Alamos National Laboratory's "Summer Teacher Institute," a month-long residential course for high school teachers which will provide instruction on developing student-based research projects around the theme of water quality. The Institute will be held July 10-August 4 in Los Alamos. Upon the teachers returning to Russia, Ludmila Nazarova will assist them in implementing this project throughout the 1995-96 academic year.

#### Student Research Summit

Workshop participants developed a framework for the end-of-the-year Student Research Summit, to be held in late-Spring/early Summer at one of the DOE facilities involved in the program. The following elements of the Student Research Summit were developed at the December workshop by all program participants:

- ← • Participation by three student representatives from each school participating in the program;
- ← • Thirty-minute oral presentations by each group of students, each to include the following elements:
  - presentation of the research question developed and studied;
  - methodology;
  - data collection and analysis;
  - results/findings;
  - recommendations/issues;
  - future research/action necessary
- ← • Visual display of oral presentations for communication to the public;
- ← • Student small group topic discussion sessions;
- ← • Teacher discussion sessions;
- ← • Involvement of Laboratory scientists;
- ← • Submission of final presentations to be compiled in a proceedings for distribution.

The Teacher Steering Committee will revise these guidelines and submit them to representatives from Los Alamos and Livermore National Laboratories and the Oak Ridge Institute for Science Education (by January 27th) for final approval. In addition, the Steering Committee will develop guidelines for student proposals and circulate these to all participating schools.

The Student Research Summit is open to all program participants. Schools wishing to participate must submit a proposal to the Steering Committee by March 3, 1995. These proposals will undergo a merit review by representatives from Los Alamos and Livermore National Laboratories and the ~~the Oak Ridge Institute for Science Education and returned~~ within two weeks of submission. It is recommended that all schools submit their proposal to their ISP partner for peer review prior to submitting it to representatives from the three DOE facilities.

### **New Mexico Regional Science Bowl**

Los Alamos and Sandia National Laboratories are once again hosting the annual New Mexico Regional Science Bowl. This event, sponsored by the U.S. Department of Energy, offers high school students statewide a forum to showcase and test their knowledge of math and science via a double elimination tournament format. Two winning teams, each sponsored by one of the two Laboratories will go, all-expenses paid, to compete in the National Science Bowl in Washington, D.C., April 28 - May 1, 1995.

The regional competition is being held in Albuquerque, New Mexico on Saturday, February 11, 1995 at the Hyatt Regency. The event will run throughout the day, with a banquet and awards ceremony to follow the competition. The keynote speaker will be Morgan MacArthur.

Announcements and applications were sent to all New Mexico High Schools in October, 1994, and to date 30 teams have entered the event. This is a 25% increase over the number of teams entered in the 1994 regional competition.

The following activities took place from October to December 1994, in preparation for this event:

- A new program coordinator was hired to coordinate the program in December.
- Tickets were ordered for the two winning teams to tour the White House during their trip to Washington, D.C., to compete at the nationals.
- We worked with CIC-1 to design the T-shirt logo.
- U.S. flags were ordered to be flown over the capitol in honor of Science Education in New Mexico. Flags to be awarded to the schools of the winning teams were purchased.
- Volunteers have been recruited for the regional competition.
- We worked with DOE and Public Information at LANL to clarify regulations regarding the participation of non-U.S. citizens in the New Mexico competition.

The remaining tasks, including facility set-up and team registration, are done cooperatively with Sandia National Laboratory.

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### **EDUCATIONAL TECHNOLOGY**

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

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In order to address the needs of two specific students ~~that~~ our speech therapy intern, Lara Dunn, has been concerned, ~~with~~ we have developed indicators for certain sounds ~~that~~ the students were having difficulties ~~with~~. Thus, we have developed an "R-Meter" and an "S-Versus-SH-Versus-Anything-Else-Meter." The "R-Meter" has a pointer that moves to the right when the user says an "R" sound, and stays to the left when the user says any other sound. The "S-SH-Else-Meter" has a pointer that moves in a triangular fashion—to the right for "SH," upwards for "S," and to the left for any other sound. Computationally, the meters are based on a weighted sum of discriminant analysis and vector quantization. Although the meters appear to be useful in their present forms, it is apparent from watching people use them, as well as from exercising them ourselves, that they would be much more useful if they were better integrated into our system, in that they should be implemented as tongue movements rather than as separate meters. Of course, we intend to implement them that way. We must also mention some failures (for now) in our efforts. Analogously to our successful meters, we attempted to develop meters for "R-Versus-L Versus-Anything-Else," with obvious implications for teaching English pronunciation to Japanese students. This did not work, which we believe is because of the acoustic representation we use. Therefore, this effort requires modification. We also tried to develop an "N-M-NG-Meter"—which is crucial for teaching hearing-impaired students, as they do not otherwise have information about the movements of their velum. We believe that a successful "N-M-NG-Meter" will also require modification of the acoustic representation we use.

In this quarter, we have improved the fundamental frequency analysis routine so that it now gives more stable results than it did previously. We have also determined how our system can be implemented on hardware that is much less expensive than we used previously, which will be important in providing for distribution of the system to schools.

An invited presentation was given to a forum at the University of Colorado Departments of Linguistics, Education and Computer Science. The reception was over-whelmingly enthusiastic, and has paved the way for applications of our technology to helping students with dyslexia.

## **Internetworking Models for Schools**

We are documenting selected sites as models for schools wanting to connect to the Internet and we are disseminating information learned through our School Networking Advisement Program.

Models in Progress – (Current status information on most sites is included in the update for the Technology Planning Support for Schools Project, *elsewhere in this report.*)

Los Alamos Middle School (LAMS) – LAMS was documented last year as a model for connecting middle schools to the Internet. We have been gathering information this quarter to document the second-year impact of the project.

Cuba Independent Schools (CIS) – CIS is an internetworking model for small rural school districts. We did pre-Internet teacher surveys and have gathered a lot of information this quarter. We are preparing a paper on this model for publication and distribution next quarter.

Pojoaque Schools – The Pojoaque Schools Internet project is a model for small school districts starting "from scratch" who want to get Internet access. We have been working with this district from the beginning network diagrams, through funding and bond issues, to Internet connections.

#### Conferences and Presentations this Quarter

- Telecommunications in Education (Tel\*Ed) Conference, Albuquerque, November, 1994.
- Supercomputing '94, Washington D.C., Education Exhibits, November, 1994.
- DOE Education Directors' <sup>Conference</sup> Meeting, Marketplace of Ideas , Washington, D.C., December, 1994.

Students and teachers from the Cuba Schools and the Los Alamos Middle School Model sites were big hits at the Tel\*Ed '94 Conference in November. An article on the Cuba schools appeared in the Albuquerque Sunday Journal in December.

Our programs, presented in the Marketplace of Ideas at the DOE Education Directors' <sup>Conference</sup> Meeting, received a lot of interest from other laboratories and DOE Washington representatives. We have been asked to provide more input and consider more collaborations with other DOE facilities and DOE education offices for similar efforts nationwide.

We use and rely on many excellent education Internet resources to custom-design training and resource lists for our sites. LANL-developed resources like Calvin Hamilton's Solar System Tour and the LANL Internet Resources Mosaic page are very popular. The Sunrise NII Education Research Project and EduNets program homepages and school site homepages have been well-received. A prototype science education server and a science education homepage have been developed (see Science Education On-line Database elsewhere in this report) that we will begin using with the sites, and we are working on getting GeoNet and Mega Math in use at the Internet test sites.

#### GEONet/TOPS Electronic Bulletin Board

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#### Cyberpede Systems Modeling for Education

The program has assumed a clear direction as a result of a three-fold effort this past quarter. The teacher development team continued classroom field testing and writing summary reports of the previously developed classroom scenarios. The program coordinator conducted additional research to make a final determination of the feasibility of developing a robotics platform for educational purposes. The development team considered and explored alternative approaches besides robots to accomplish most of the original program goals.

The new program direction is actually an extension and refinement of one of the classroom scenarios that had been developed and tested during the Fall semester. The

## GEONet/TOPS Electronic Bulletin Board

During this last quarter, the GEONet/TOPS Electronic Bulletin Board Network was extended to include the participants of several more LANL science education programs. The list of programs now served include:

- ~~TELES~~ Teacher Opportunities to Promote Science
- ~~NETP~~ National Teacher Enhancement Program
- ~~SEEP~~ Science Teacher Enhancement Program
- ~~NEB~~ National Geographic Kids Network
- High School Critical Issues Forum.

• The participants of these programs are now able to communicate with each other and with the laboratory coordinator and scientists through the network. In addition, the TOPS Mentor program is planned to be added in the next quarter.

The Bulletin Board was a featured demonstration at the TELTED 94 Conference in November, and at the DOE Education Director's Conference in Washington in December.

program will emphasize the use of sensors, systems control technologies, and systems modeling to develop a high-interest scenario that involves real-world applications. The scenario currently being explored is based on the idea of students creating/modeling a suitable complex ecosystem or biosphere. The project goals are to help develop tools, resources, and skills for teachers to use to support the exploration of this scenario.

Since a biosphere is a complex physical-biological system, the opportunities for learning science concepts and process skills are abundant. The task is to integrate sensor/system hardware and software into appropriate learning activities, develop a technical computer-interface to facilitate student learning of science concepts, develop new sensors to specifically enhance the biosphere scenario, and promote a learning process model that encourages problem-solving and critical-thinking skills. The development team will be seeking an industrial partner to participate in the development of the technical computer-interface that will allow students to construct and monitor physical and computer models of appropriate complex systems.

### **National Study of Viable Models of Networking Technology**

In early October, Dr. Michael Smith, Director of the Institute for Educational Technologies at the University of Tennessee, completed drafts of phone surveys and written questionnaires to be given to superintendents, building and district technology coordinators, principals and teachers at the 30 sites selected to participate in the study. The surveys are intended to provide information for site visit teams in advance of their visits, which are scheduled to begin in March, 1995, and the questionnaires are intended to provide information independent of data gathered during site visits.

On October 26, 1994, we held a phone conference with representatives from each of the Department of Education's (DoEd's) ten regional laboratories (RELs), which are officially collaborating with us on the study. During the conference, we began the site and site visit team selection process, we verified the timeline of tasks and activities for the study, and we established dates for follow-up working meetings in November and December.

*Dr. Preston*  
By invitation, on November 11, 1994, we presented an overview of the project at Tel\*Ed '94, an international educational telecommunications conference in Albuquerque, NM, which drew more than 1,600 people. Subsequently, we received a number of inquiries from school districts and research institutions across the country interested in participating in the study. Pristine Kronkosky, Director of the Southwest Educational Development Laboratory and co-chair of a joint DOE-DoEd task force, indicated that he hoped this study would represent a major collaboration between DOE and DoEd.

In late November we completed a research design brief, which we asked experts in evaluation and assessment across the country to review. On the basis of their feedback, we met again with REL representatives in St. Petersburg, FL, on December 8, 1994, at a regularly scheduled DoEd meeting, and we began to discuss the logistics of the training of site visit teams, the conduct of site visits, and the analysis and dissemination of study data. An important facet of data dissemination will be the design of WWW pages, which will link study findings and products with pages at the DOE-HPCC, the RELs, the school sites, and other web education servers.

In mid-December we began to map out the agenda for site visit team training at Far West Laboratory in San Francisco, February 5-7, 1995. We also began to contact sites

nominated by the RELs, state departments of education and education organizations across the country. To date, more than 80 sites have been nominated. We expect to make our final site selections in mid-January and to have a site visit schedule prepared by the end of our training session.

## Robotics Challenge

The Robotics Challenge is a competition to encourage and support students in building simple and inexpensive robotics devices to compete in various events, and to provide guidance and information on how they can be built. It is intended for students of all levels. The Challenge is held once each year, and its goal is to get students interested and excited about science and engineering.

The Challenge stresses innovation rather than competition. The robots do not need to be precisely engineered, nor do they have to fit preconceived notions or rules. Criteria such as sophistication of behavior, novelty of design, efficiency of power source and quality of hardware innovation are used to judge the entries. Special consideration is given to solar-powered robots. Materials made available to students in advance point out inexpensive sources of components, such as "dead" calculators, cassette players, and radios. Often students can build several robots without any expenditure at all.

The 1995 Robotics Challenge will be held May 4-7, in conjunction with the Fourth International BEAM Robot Games, at the Glorieta Conference Center, Glorieta, New Mexico. A brochure is available and has been mailed out, as well as placed on the Internet. We are now organizing the individual events and getting volunteers to man those events. Response has already been enthusiastic, both from the Laboratory and from potential student competitors.

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## ~~Tel\*Ed '94~~ TELECOMMUNICATIONS IN EDUCATION 1994

The Laboratory sponsored, directed and produced a special event at the Telecommunications in Education 1994 (Tel\*Ed 94) Conference held in Albuquerque from November 10th through the 13th, 1994. The conference is an annual event put on by the International Society for Telecommunications in Education and, this year, attracted an international attendance of over 2000.

The Laboratory event was the Telecom <sup>m</sup>Rodeo in which New Mexico schools and other organizations participated to provide a hands-on experience with existing programs using telecommunications for education. ~~Produced by Andy Andrews (LANL) and directed by Tamara Wells-Banar (LANL) and Cece Conn (SIGGRAPH)~~, The event occupied over 8000 square feet of exhibit space, as well as coverage by local television ~~was good~~. Exhibitors were connected to the Internet via a T-3 cable supported by LANL personnel, and well as several telephone lines for modem and fax hook-ups. Participants included K-12 organizations through postgraduate institutions and ranged in age from 5 through retirement. The organizations included public schools, universities, private schools, LANL, and SNL.

Laboratory exhibits included the GEONET/TOPS network, NEWNET, Ring of Light, MegaMath, the Science Education and Outreach Office, the Sunrise Project, the Supercomputing Challenge and Students Watching Over Our Planet Earth. As part of the Sunrise display, students captured and reported events of the conference on a World Wide Web home page. Also, as a result of the displays, the Laboratory was approached by EnterLearn Technologies to establish a CRADA for the further development and distribution of MegaMath.

~~NEWNET~~ A NEWNET exhibit was displayed at TEL\*ED '94 and was received very favorably by school teachers across the nation. Many teachers could see immediate benefits to their science programs by using the "hands on" approach NEWNET offers. Two teachers took strong enough interest to begin organizing support at their schools for NEWNET immediately after they got home. One of the teachers, from Smokey Hill High School near Denver, is actively trying to get funds to implement a NEWNET station at his school. We are trying to help by connecting his efforts to the Rocky Flats plant. We also had active interest from Crown Point Technical Institute in the Navajo Nation.

NEWNET Station At Nauticus – A NEWNET station has been installed on the roof of the Nauticus Museum. The museum is currently closed for remodeling, but when it reopens, the NEWNET station will be activated. The station will transmit meteorological and radiological measurements to Los Alamos via satellite where data will be stored in databases and will be accessible through the Internet. Future plans include installing an Environmental Teller Machine at Nauticus that will allow easy access to the Nauticus station data as well as all other NEWNET stations.

Environmental Teller Machine – The Environmental Teller Machine (ETM) software was upgraded to incorporate the following changes.

- Function keys were replaced with point and click software. Conversion to a touch screen version is expected to be easy, if desired.
- Audio files were revised to replace music with informational messages and operational instructions.
- The ETM has been converted to use a dial-up telephone circuit instead of a high speed communications circuit. The ETM will auto-dial and download data files nightly. Different network protocols are being examined to increase the speed in transferring data.
- The IDL graphics package was replaced with a Visual Basic graphing application, and the graphing software was extensively modified.
- All ETM screen displays were redesigned.
- An ultraviolet radiation index data was added as a possible choice for data parameters.
- Speed and efficiency were improved in the ETM software.

In addition, we have been discussing a software design for an ETM at Nauticus with Marsha Davis of EnterLearn Technologies.

## NEWNet

We have been discussing ETM hardware specifications and a kiosk case design with the New Mexico Museum of Natural History in Albuquerque. We will be meeting with representatives from the museum in February to look at their kiosk and discuss a possible source for kiosk hardware.

We have renewed contact with Kathy McKee at Motorola in Phoenix concerning a partnering relationship for developing an environmental curriculum for NEWNET.

## **Technology Planning and Support for Schools**

This program is designed to use Laboratory expertise and experience to develop and document feasible and validated models of school networking, building upon both school resources and national laboratory resources in partnership arrangements.

Primary sites targeted this quarter were:

Cuba Independent Schools – The Superintendent's and School Administrative Offices, High School, Middle School, and Elementary School are networked. Each classroom and office has both Internet and local area network access. Networking software sets and teacher Internet diskettes have been developed, installed, and distributed; an electronic mail (e-mail) server and e-mail accounts for all staff have been set up; and two all-staff workshops and special "lead" staff training sessions have been held. The first in-service workshop for teachers (on using Mosaic and gopher education resources on the Internet) was held mid-September and we could see an impact on the network use by October. In the first three months, Cuba teachers have been using the Internet to access a variety of educational resources for their classes at all levels (elementary through high school), librarians are using the Internet to facilitate inter-library loans, and students have been using the resource in research projects. It's a great feeling and very rewarding to see the project impact so fast!

A second inservice workshop was conducted in December, and individualized support staff training was started for lead teachers and librarians. The LANL team designed a PC-based "Internet boot" diskette to make it easier for teachers to access the Internet resources and to make Internet access work smoothly with the administrative local area network. We plan to use this design with future sites. Students and teachers from the Cuba Schools were big hits at the Tel\*Ed conference in November. An article on the Cuba schools appeared in the Albuquerque Sunday Journal in December.

Pojoaque Schools – Pojoaque Schools have their 56KB line installed, the Middle School computer laboratory is up-and-running, a Sun server has been set-up, and the LAN design for the Middle School and High School has finally been approved and contracted.

*Division One member of the LANL team*

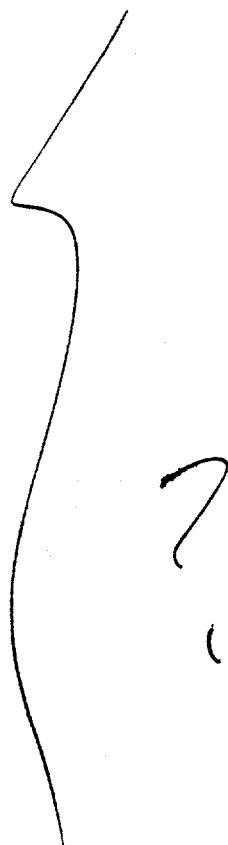
The Navajo Nation, Crownpoint Community Project – We are working with the Navajo Nation Networking Project as part of the LANL support effort coordinated by ~~Bill Bestwick, CIC. Pat Eke~~ is the technical education advisor and is working with the Education Working Group and Steering Committee. Another member of the LANL team is the networking advisor and is a member of the Technical Committee for the project. The Crownpoint community is being designed as a prototype and hub for the Navajo Network, and the entire LANL team will be working a lot with Crownpoint schools starting in January. Several news articles have been in the New Mexico papers on

the Crownpoint project in the past few months. We anticipate a lot of interest in this project.

University of New Mexico (UNM) – Gallup and Gallup-McKinley County Schools – As an extension of the Crownpoint effort, we are also working with UNM-Gallup and will collaborate with them on networking planning support for the Gallup-McKinley schools and advising and training staff for ongoing support.

Las Cruces Schools – We started working with the Las Cruces schools and New Mexico State University to help test their lines to resolve some networking problems at Oñate High School and are now helping advise them on networking and technology planning.

School sites scheduled for preliminary analysis in January: El Dorado Elementary School and Alvord Elementary School, Santa Fe. Requests in the queue include: Rio Rancho Schools; Cimarron; Bloomfield Middle School; Pinon and Mountain Elementary Schools, Los Alamos; Las Vegas and Española Schools.



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~~→ Sunrise Planning Support for Schools~~  
~~1 Sunrise Education Research Project 2~~

Using real-time digital video and synchronized sound on the Internet via high-speed lines, the Sunrise NII Education effort has been designed to test high-speed multimedia technologies with an educational target population.

The following test sites are fully established and have students and teachers developing multimedia applications on-line: Los Alamos High School and Onate High School, Las Cruces. The test site at the Maui High Performance Computing Center is still in the testing phase. New sites in request/planning stage: Albuquerque High School and Highland High School in New Mexico and a California School District.

#### Conferences and Presentations

- Telecommunications in Education (Tel\*Ed) Conference, Albuquerque, November 1994.
- Supercomputing '94, Washington D.C., Supercomputing '94 Exhibits and Education Exhibits, November 1994.
- DOE Education Directors' Meeting, Marketplace of Ideas, Washington, D.C., December 1994.

Sunrise teachers and students were a big hit at the Tel\*Ed Conference in November. The requests are still rolling in to be new test sites. The Sunrise Education Program also got a lot of attention on the floor at Supercomputing '94, in Washington, D.C. in November. Demonstrations were done all week in the LANL supercomputing exhibit on the main exhibit floor of the conference, and information on the program was also presented in the educational exhibits session at the conference.

This research program is sponsored by the LANL Laboratory Directed Research and Development (LDRD), but is reported here because of its significant educational applications.

## PUBLIC UNDERSTANDING OF SCIENCE

### Perspectives/Science Newsletter

In December 1994, a graphics designer completed the redesign of *Perspectives on Science*, changing the format from a quarterly newsletter to a magazine. We had commissioned the redesign, as a result of findings from our formative evaluation report and our desire to produce a high-quality product in a timely and cost-effective fashion. In the process of redesign, we created a new organization and expanded the content for the publication.

The designer is just completing formatting the second issue of the magazine on the theme of time. This Winter, 1995 issue will be mailed to our distribution during the month of February. In the meantime, we have been compiling text and graphics for our next two issues on maps and networks, respectively. The mapping issue will include articles on several Laboratory projects, including the mapping of the human genome, the

tracking of environmental restoration using a three-dimensional database, and computer modeling of complex natural phenomena. The issue on networks will focus on use of the Internet in education and will provide guides for use of the Laboratory's WWW pages.

We have continued to receive requests for copies of our first issue of *Perspectives*. To satisfy these requests, we ordered a reprinting, using our new format, and we will mail out copies of the reprint this month.

The Bradbury Museum has also asked for additional copies of *Perspectives* for distribution at the museum and for mail out, upon special request, to students, teachers and researchers across the country, who are not part of our regular distribution. The museum has found the articles on Los Alamos' history and ongoing research particularly valuable in their dealings with the public and has made xerox copies of a number of articles available as part of packages for school visits to the museum.

## Family Math

Family Math teacher and parent instructors presented evening math activity sessions for families at their local school sites during August and September, 1994. The program coordinator visited selected sites and coordinated disbursement of materials and instructor stipends.

Evaluation materials were collected and processed, a yearly report was written, and a proposed budget for FY'95 submitted. The number of program sites to be offered in FY '95 was scaled back. Problems with instructor stipend checks were addressed. Planning for FY'95 program announcement mailings and the selection process was begun.

## Science at Home

The Science at Home program is sponsored by the U.S. Department of Energy at Los Alamos National Laboratory. It was developed for dissemination to schools at the local, regional and national levels. Modeled after the Family Math program developed at the Lawrence Hall of Science, Science at Home is designed to increase public awareness toward science and to provide an opportunity for K-8 students and parents to conduct science experiments using common household items. The Science at Home program is a three-phase project.

Development of the Science at Home activity book occurred during Phase 1. Activities in the book were developed to appeal to students, parents, and teachers. They were tested and revised before the initial draft version was published.

Phase 2 started in the third quarter and continued through the last quarter. It included the pilot stage where six elementary and middle school sites in Northern New Mexico were chosen to participate in the program. Two-member teams from the communities of Bloomfield, Cochiti, Lybrook, Tucumcari, Santa Fe, and Cimarron were selected through an application process for training in the Science at Home program. The pilot stage provided training, activity books, and implementation guides to the facilitation teams and activity books for the participating families. Each team was responsible for training (modeling the program) to a minimum of 5 families in their respective communities and to provide evaluative data to our office. During the pilot stage, each site was visited twice by the program coordinator. Support and feedback was given to each site during the

pilot stage. A monthly newsletter was developed and mailed to all team members. This newsletter will be used as a support mechanism beyond the pilot stage. Evaluation of the program is on-going. A variety of surveys were developed and utilized to collect data from the pilot sites. Information was collected on the training sessions and the activities from the trainers and the family participants. Evaluative data collected during this stage indicates that the Science at Home program is successful and meets the goals set for the program. Data supports the effectiveness and popularity of the program.

Phase 3 will be the implementation of the program at various national sites. This phase started during the last quarter and will continue into 1995. During this phase, a train-the-trainer workshop will be developed and offered to the other national laboratories.

Other dissemination efforts include:

- A presentation about the program was given at the New Mexico Math and Science Teachers convention held in November. Approximately 205 educators in attendance received an informational packet.
- A promotional package was developed and presented at the DOE Science Education Director's ~~Meeting~~ Conference in December where the DOE sites were invited to participate in the program. ~~Meeting~~ *Other*
- A follow-up letter to each site detailing the training requirements, regional training sites, and costs.
- Publication and dissemination of the Science at Home activity books are being explored.

### **Public Access Database for Education:**

A World Wide Web (WWW) server for the Science and Math Education Program at Los Alamos has been established. The Home Page has been designed and the architecture is being implemented now. This server will link to the Los Alamos National Laboratory Web Server. Education will be one of the principal components of the newly designed LANL Home Page. That page will then link to the Education server, which will contain information about the education programs that are conducted at LANL. A variety of information will be included (and is now being installed) on the server, such as:

- program descriptions
- program announcements and application deadlines
- LANL education resources – reports, newsletters, curriculum
- upcoming conferences and events
- contacts at LANL
- etc.

The Education server is actually up and operating, but we have not yet advertised its existence since it is under construction. As the server comes closer to completion we will advertise the address. Meanwhile, there is some education material on the main LANL WWW server.

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### **OTHER**

#### **Assessing Middle School Students' Understanding of Science**

During our second project year, we will explore how well our formats and procedures work with diverse groups of teachers and students and will obtain additional evidence that our assessments are valid measures of students' understanding. We have developed four concept maps to use in our assessments, one from each of the four major areas covered in middle school science (scientific inquiry, earth science, life science, and physical science). We also have selected a set of multiple choice science achievement questions. Parts of each map correspond to the content found in half of the multiple choice questions while parts are unique.

Currently, we have asked discipline experts and science education experts to evaluate the accuracy of our maps. We also are beginning to contact two TOPS teachers to assist us in a pilot evaluation of our measures.