





IT EXPERIENCES FOR STUDENTS AND TEACHERS



ABOUT THE ITEST PROGRAM

In communities across the United States, ITEST—Information Technology Experiences for Students and Teachers—projects partner with local organizations and community members to engage young people and teachers from a variety of backgrounds in project-based, experiential science, technology, engineering, and mathematics (STEM) learning. Through ITEST, students work hand in hand with scientists and engineers on extended research projects that carry them beyond the classroom, ranging from biotechnology to environmental resource management to programming and problem-solving. These efforts draw on a wide mix of local resources, including universities, industry, museums, science and technology centers, and school districts. The ITEST program engages both informal and formal communities in order to identify the characteristics of informal settings—content and format—that make them successful for a wide range of young people, especially those who are not successful in traditional school settings. Cohort 1 and 2 projects combined will reach more than 14,000 students, 600 parents and other caregivers, and 1,100 teachers.

The ITEST program directly responds to national concerns over the potentially growing shortage of information technology (IT) workers in the United States and the need to expand and diversify the numbers of students prepared to enter careers in this field. Project participants learn about, experience, and use IT within the context of STEM education, explore IT career options, and envision opportunities for diversity and equity within the STEM field. STEM teachers also gain familiarity with IT applications and, by working with students, gain the experience needed to facilitate the translation to classrooms.

The ITEST Learning Resource Center, based at EDC, provides resources and support and promotes cross-project interaction. The Center will develop successful models, identify relevant research, and design activities for achieving program goals. By gathering, synthesizing, and disseminating data, information, lessons, and findings, the Center is creating a national resource and public presence for ITEST.

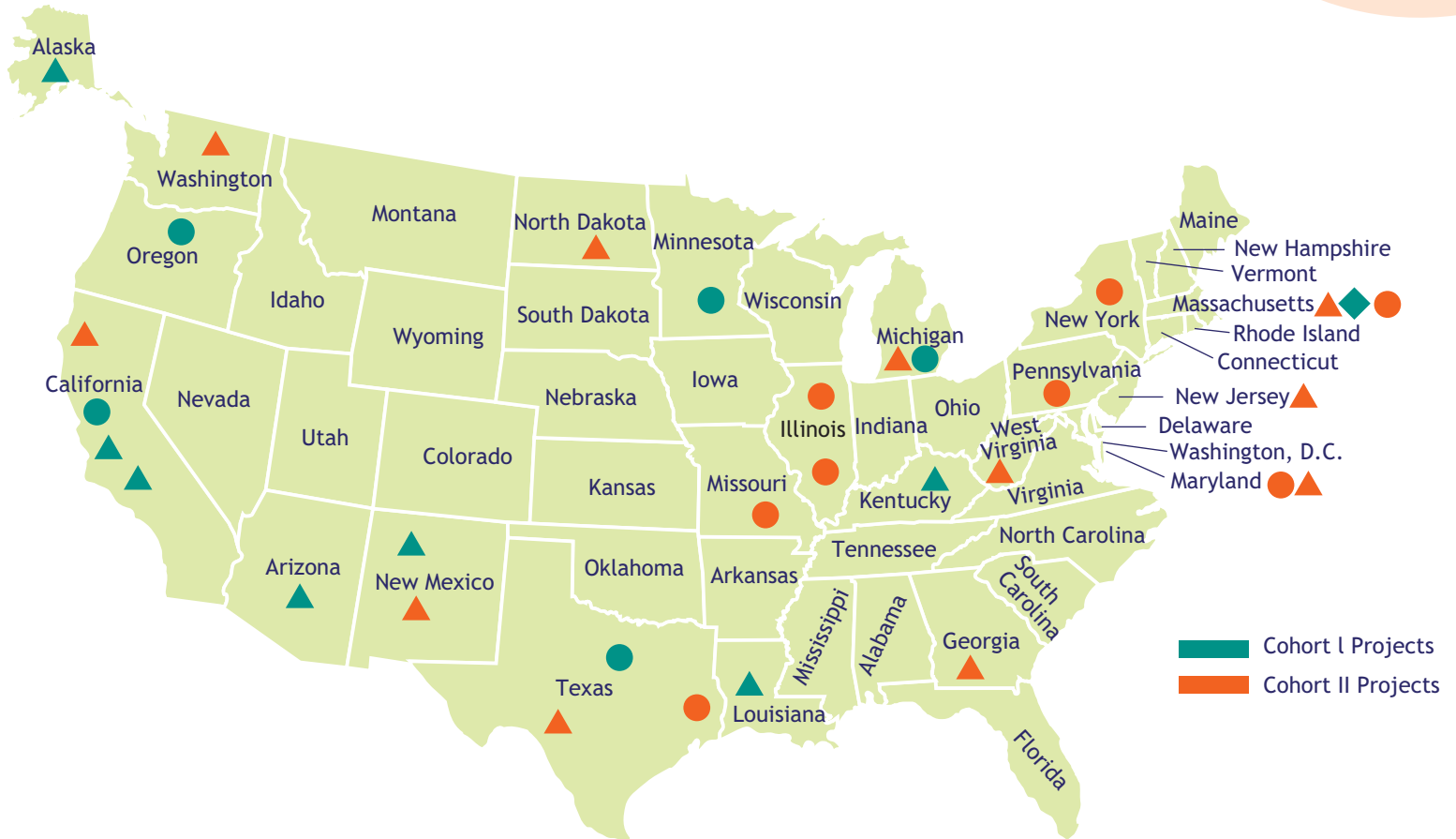
ITEST is a program within the Division of Elementary, Secondary, and Informal Education (ESIE), a branch of the National Science Foundation's (NSF) Directorate for Education and Human Resources. Funds focused on K–12 education have allowed ESIE to re-establish student-based research programming that was discontinued in the late 1990s.

ESIE supports NSF's mission of providing leadership and promoting development of the infrastructure and resources needed to improve preK–12 STEM education throughout the United States. ESIE's comprehensive and coherent, research-based program portfolio develops the nation's capacity to support high-quality STEM education. Innovative instructional materials and student assessments, as well as new models for the delivery of teacher professional development, contribute to STEM classroom environments that enable all students to achieve their full potential.

Title IV of the American Competitiveness and Workforce Improvement Act of 1998 (Public Law 105-277) established an H1-B Nonimmigrant Petitioner Account in the general fund of the U.S. Treasury for fees collected from each petition for alien non-immigrant status. That law required that a portion of those funds be made available to the National Science Foundation (NSF) to support low-income scholarships in computer science, engineering, and mathematics, as well as to initiate special K–12 education efforts. The amended American Competitiveness in the 21st Century Act of 2001 (Public Law 106-313) continued and expanded that support.

ITEST PROJECT LOCATIONS

ITEST is a program established by the National Science Foundation—in direct response to the concern about shortages of technology workers in the United States—to provide school-age children and teachers with experiences that build the skills and knowledge needed to advance their study and to function and contribute in a technologically rich society. In school and during out-of-school time, in rural, urban, and suburban locations across the United States, ITEST projects offer their participants unique opportunities that expose them to science, technology, engineering, and math content and careers.



ITEST has three types of projects:

- **Youth-based** projects with a strong emphasis on career and educational paths that offer year-round IT enrichment experiences for middle and high school students
- △ **Comprehensive** projects for students and teachers that provide teacher professional development in IT concepts, skills, applications, and pedagogical strategies that promote investigation and inquiry
- ◇ A **resource center** that engages in research related to funded projects, provides technical support, and gathers, synthesizes, and disseminates project models, instructional materials, and promising practices

ITEST Cohort I [2003-2006] Project Information at a Glance

Project/Sponsor	Project Type	Participants/Communities	Profile Page
Delta Agriculture Middle School Applied Life Science (DAMSALS) University of Louisiana-Monroe	Comprehensive	72 science, technology, and math teachers in grades 7-12 who work with 180 students in the Mississippi Delta region of northeast Louisiana [rural]	5
DesignIT Studio Fort Worth Museum of Science and History	Youth-based	160 minority middle school students in Fort Worth, Texas [urban]	6
Detroit Area Pre-College Engineering Program (DAPCEP) Engineering and Information Technology Education Project Detroit Area Pre-College Engineering Program	Youth-based	120 African American and Latino 7th and 9th grade students and parents in the Detroit area [urban]	7
Environmental Science Information Technology Activities University of California-Berkeley	Youth-based	169 8th-12th grade students in Oakland, Richmond, and Sacramento, California [urban]	8
Eyes in the Sky: Applied Information Technology Project TERC, Inc.	Comprehensive	48 minority high school teachers who work with 120 students in Phoenix and Tucson, Arizona [urban]	9
IMMEX Fayette Consortium: Community Integrated Problem Solving Fayette County Public Schools	Comprehensive	43 7th-12th grade students and 86 teachers in Lexington, Kentucky; continuing into first two years of college for students interested in pursuing IT careers [urban]	10
Inquiry-based Marine Biotechnology and Bioinformatics for Teachers and Students San Jose State University Foundation	Comprehensive	30 middle and high school teachers from the Monterey, Santa Clara, Santa Cruz, and San Benito counties of California, who will provide instruction to 5,000 students [suburban]	11
ITEST Learning Resource Center Education Development Center, Inc. Newton, Massachusetts	Resource Center	Principal investigators, staff, and evaluators of ITEST projects around the United States, estimated to be 50 projects by 2006	12
MAPTeach: Place-based Geospatial Learning and Applications in Rural Alaska University of Wisconsin-Madison, Alaska Division of Geological and Geophysical Surveys, and University of Alaska-Fairbanks	Comprehensive	160 secondary students , mostly Native Alaskans, and 16 teachers , in regions of Alaska characterized by poor standardized test scores, high dropout rates, and struggling cash economies [rural]	13
MyBEST: Mentored Youth Building Employable Skills in Technology Science Museum of Minnesota	Youth-based	200 students in grades 7-12, with special emphasis on girls and youth of color, from the Minneapolis/St. Paul, Minnesota, area [urban]	14
New Mexico Adventures in Modeling: Integrating IT into the Curriculum Through Computer Modeling Approaches Santa Fe Institute and Massachusetts Institute of Technology	Comprehensive	75 science, math, and technology teachers of grades 6-12 in Santa Fe, New Mexico [urban]	15
Ocean Explorers: GIS, IPA, and Ocean Science for IT Literacy and Skills Center for Image Processing in Education	Comprehensive	60-100 middle and high school teachers and 200 of their students from the greater Los Angeles area and throughout southern California [urban]	16
Salmon Camp Research Team: A Native American Technology Research and Science Career Exposure Program Oregon Museum of Science and Industry	Youth-based	180 first-generation college-bound middle and high school Native American students in Oregon, Washington State, and California [rural]	17

ITEST Cohort II [2004-2007] Project Information at a Glance

Project/Sponsor	Project Type	Participants/Communities
American Museum of Natural History ITEST High School Science Research Program American Museum of Natural History	Youth-based	120 female, minority, and physically challenged high school students in grades 9-11 in New York City [urban]
Bioinformatics: The Rutgers Initiative in Teacher Enhancement (BRITE) Rutgers University	Comprehensive	155 high school teachers, who will offer instruction to 5,500 students in New Jersey [urban/suburban]
Building IT Skills Among Inner City Youth in North Philadelphia Through Development of a Community Geographic Information System Temple University	Youth-based	270 female, Hispanic, and African American students in Philadelphia, Pennsylvania [urban]
Comprehensive Information Technology Education in Rural Appalachia (CITERA) Institute for Scientific Research, Inc.	Comprehensive	60 middle school STEM teachers, 90 students, and 15 guidance counselors in north central West Virginia [rural]
CyberTech Computer Science Program to Prepare Under-represented Students for Careers in the Sciences Kennesaw State University	Comprehensive	600 high school students (with a focus on African Americans, Hispanics, women, and first-generation college-bound youth) in grades 10-12, and 60 teachers from 10 high schools in Georgia [suburban/rural]
Eagle Vision: Employing Geographic Information Technologies in Indian Schools and Communities Pueblo of Laguna Department of Education	Comprehensive	20 teachers and 120 students at several tribal schools serving American Indian youth in the Pueblo of Laguna, New Mexico [rural]
Enhancing Science and Technology Education and Exploration Mentoring (ESTEEM) University of Maryland, Baltimore County	Youth-based	336 middle school students (with a focus on girls) from 6 schools in the Baltimore, Maryland, area [urban]
Inquiring with GIS (I-GIS) Project: A Partnership Between Scientists and Educators University of Maryland Center for Environmental Sciences, Cambridge	Comprehensive	60 middle and high school teachers and 120 students from western Maryland and northern West Virginia [rural]
Museum Tech Academy Illinois State Museum Society Center for American Archeology	Youth-based	90 students ages 12-17 in Springfield, Illinois [urban]
National Middle School Aerospace Scholars (NaMAS) San Jacinto College District, Texas	Comprehensive	150 middle-grades science, mathematics, and technology teachers and 600 students in an eight-state region
Nature Works Studios Chicago Academy of Sciences	Youth-based	45 students (with a focus on African Americans, Latinos, and girls) in the Chicago, Illinois, area [urban]
Project La Costa Southwest Texas State	Youth-based	250 Hispanic students in grades 8-10 from five Central and South Texas school districts [rural/suburban]
Robotics: Fundamentals of Information Technology and Engineering Northeastern University	Comprehensive	90 7th and 8th grade STEM teachers and 1,800 students in Boston and other Massachusetts communities [urban]
Rural Schools Science and Information Technology The Inland Northwest Community Access Network	Comprehensive	60 teachers and 700 students in Washington State [rural]
Technology at the Crossroads Simmons College, Massachusetts	Youth-based	235 middle school students (with a focus on girls) in Boston, Massachusetts [urban]
Translating Information Technology Into Classrooms: Teacher-Student Research on Lake Erie Ecosystem Wayne State University	Comprehensive	45 science, mathematics, and technology teachers and 225 of their students in Detroit, Michigan [urban]
Understanding the Science Connected to Technology (USCT) Tri-College University, Center for Watershed Education	Comprehensive	81 teachers and 758 students in the Fargo, North Dakota, area [rural]
YES To Technology (YES-2-Tech) St. Louis Science Center	Youth-based	60 high school students in St. Louis, Missouri [urban]
YouthLink: Comprehensive, Innovative and Advanced Digital Technology Experiences for Underserved Teens Bay Area Video Coalition	Youth-based	120 students ages 14-18, 150 parents, and 60 educators in San Francisco, California [urban]

Delta Agriculture Middle School Applied Life Science (DAMSALS2)

PRINCIPAL INVESTIGATORS

Patty Watts
Eric A. Pani
Michael A. Camille
Charlotte H. Owens
University of Louisiana-Monroe

PROJECT LOCATION

Mississippi River Delta of Northeast Louisiana

ABOUT THE PROJECT

The DAMSALS2 comprehensive project provides professional development for 72 science teachers who in turn will provide staff-supported IT instruction for 180 students. Participants include students in grades 7–12 from rural schools in the Mississippi Delta region of northeast Louisiana. The project uses an integrated science approach to deliver agriculture-related concepts.



RECENT PROJECT ACTIVITIES

- Conducted a three-week summer institute for middle school teachers.
- Organized a “Scientists Convention,” attended by 65 guests, where participants presented the results of their research during the summer institute.
- Offered four week-long science and technology summer camps for students located in rural school systems where participants teach.



WEBSITE

www.ulm.edu/damsals2

DesignIT Studio

PRINCIPAL INVESTIGATORS

Robert L. (Chip) Lindsey
Joyce M. Baker
Kit Goolsby
Kevin E. Foster
Fort Worth Museum of Science and History

PROJECT LOCATION

Fort Worth, Texas

ABOUT THE PROJECT

The DesignIT Studios youth-based project creates four IT studio sites to work with 160 7th and 8th grade students. The four project sites—a central site at the Fort Worth Museum of Science and History, sites at each of two Boys and Girls Club branches, and a site at an area school—infuse digital technology and science, math, and engineering concepts into a creative art studio environment. Projects, springing from the children’s own cultural backgrounds and interests, incorporate commonplace materials with digital media to naturally create fluency in IT. Partners of this project include Boys and Girls Clubs of Greater Fort Worth, Lockheed Martin, IBM, Fort Worth Independent School District, and TCU.



RECENT PROJECT ACTIVITIES

- Conducted four intensive two-week summer workshops with middle school students from local Boys and Girls Clubs and the Applied Learning Academy who had been participating in related programs during the school year. Workshops each had themes and guest presenters, which gave students an opportunity to connect with adult experts in different areas of IT.
- Students became fluent with using IT programming tools to be creative, including use of the Micro Worlds program to connect the real world to virtual environments. For instance, students used these technology tools to make sensors that track the movements of squirrels and wind in the trees in the museum courtyard and then display the results graphically, create robotic music makers, and animate their own stories.



WEBSITE
www.fwmsh.org

Detroit Area Pre-College Engineering Program (DAPCEP)

Engineering and Information Technology Education Project

PRINCIPAL INVESTIGATOR

Margaret Tucker

PROJECT LOCATION

Detroit, Michigan

ABOUT THE PROJECT

DAPCEP's youth-based Engineering and Information Technology Education Project aims to engage students in activities that will increase their access to IT within the context of engineering and increase their opportunities to explore related college and career paths. One hundred twenty African American and Latino seventh and ninth grade students and 180 parents participate in carefully planned courses designed to expand their knowledge of engineering and to lay the foundation for successful lifelong learning related to a range of IT.



COMMENTS FROM PROJECT PARTICIPANTS

- *"I am very fortunate to have been selected as an ITEST participant—I have improved my overall academic GPA, and I have matured through my ITEST learnings. All I needed was an opportunity. Thank you, ITEST!"*

—9TH GRADE STUDENT, ALBERT A.

Comments shared after completing "Web Page Design" at the University of Michigan-Dearborn.

- *"My son, Austin, has the desire to be an engineer or a scientist and I struggled to find a program that would encompass both. The ITEST/DAPCEP program is the answer to our dreams."*

—PARENT OF AUSTIN L., SEVENTH GRADE STUDENT

Comments shared at the closing ceremony of the 7th Grade Summer class, "Engineering a Vehicle," at the University of Detroit-Mercy.

- *"The ITEST/DAPCEP program is a great opportunity for young people to get college experiences as well as work with college professors, engineers and scientists."*

PARENT OF MIKEL J., 9TH GRADE STUDENT

Comments shared at the closing ceremony of the 9th Grade Summer class, "Laboratory Science with Computer Integration, at the University of Michigan-Dearborn.



WEBSITE

www.dapcep.org

Environmental Science Information Technology Activities (ESITA)

PRINCIPAL INVESTIGATORS

Kevin E. Cuff
University of California-Berkeley

Marco Molinaro
University of California-Davis

PROJECT LOCATIONS

Oakland, Richmond,
and Sacramento, California

ABOUT THE PROJECT

The ESITA youth-based project provides opportunities for students in grades 9 and 10 from disadvantaged backgrounds to learn about and use IT. During each of three years, 48 students will acquire and employ IT skills as they conduct air and water quality research in their communities and research attitudes toward, and feelings about, IT among their peers.

RECENT PROJECT ACTIVITIES

- More than 30 separate inquiry-based curriculum activities were developed and used in after-school programs in the East San Francisco and Sacramento Valley areas during 2004. More than 55 students in grades 8–11 participated in these programs.
- ESITA students in the East San Francisco Bay Area established e-mail correspondence with elementary school children in Washington, D.C., who later sent samples of drinking water from their school and homes along with information on the locations from which the water samples were collected. All samples were prepared for lead analysis at Lawrence Hall of Science by ESITA students, who then used the resulting data to perform a preliminary assessment of the geospatial distribution of lead trouble spots throughout Washington, D.C. The majority of the samples collected contained more lead than the EPA action level of 15 ppb!
- ESITA students participated in a series of field trips, during which they applied some of the skills they acquired through their participation in mini-course activities. One trip was to the active volcano known as Mount Lassen in Northern California, where students participated in a survey that required them to use GPS units to record precise locations of sites from which soil-gas concentration measurements were made.
- ESITA partner students in the Sacramento area High School Biophotonics Research Academy conducted prototype activities in the Spring of 2004 and in August, 2004, 15 students started the year-long academy after a highly competitive application process.



Eyes in the Sky

Applied Information Technology Project

PRINCIPAL INVESTIGATORS

LuAnn Dahlman
Carla McAuliffe
Jeffrey F. Lockwood
TERC, Inc., Massachusetts and Arizona

PROJECT LOCATIONS

Phoenix and Tucson, Arizona

ABOUT THE PROJECT

Eyes in the Sky is a comprehensive professional development program that prepares 48 STEM teachers to use geospatial IT, computer mapping programs, aerial and satellite images, and image analysis software with their students in community-based research projects. Teachers engage in a distance-learning course, two weeks of face-to-face workshops, a classroom implementation phase, and a research showcase event. One hundred twenty students participate in a one-week Summer Institute as part of the project, learning about and using geospatial IT in activities related to careers that use these technologies.



Institute: they presented GIS and image analysis lessons to students and helped them with troubleshooting during the second week. Presenting to students in the Summer Institute increased teachers' confidence levels that they could present the technology successfully in their regular STEM classes in the fall.

- Participating teachers and students were from schools with large minority populations. The teachers and students both felt the Institute was an excellent experience.
- In terms of using the technology, the students were light-years ahead of the teachers. This showed the teachers that they don't need to be IT experts—they just need to introduce how the technology can be used as a tool for research, then let the kids run with it.

RECENT PROJECT ACTIVITIES

- Teachers learned to use GIS (Geographic Information System) and image analysis software in an online distance-learning course prior to their Summer Institute. The schedule gave participants ample time to become familiar with the software so they were well prepared to participate fully in the Summer Institute.
- Teachers were very motivated to get ready to teach the technology during the first week of the Summer

WEBSITE
eyesinthesky.terc.edu/

IMMEX Fayette Consortium

Community Integrated Problem Solving

PRINCIPAL INVESTIGATOR

Greg A. Drake
Fayette County Public Schools

PROJECT ADMINISTRATOR

Lucinda Sanders
Fayette County Public Schools

PROJECT LOCATION

Lexington, Kentucky

ABOUT THE PROJECT

The IMMEX Fayette Consortium is a comprehensive project for urban students and teachers that provides students in grades 7–12 with a solid foundation in science, technology, engineering, and mathematics. This is a community-integrated model in which teams of teachers, students, business partners, and higher education faculty construct interactive, problem-solving simulations integrating standards-based curricular content and technology issues commonly encountered in STEM careers in technology institutes for teachers and students. The institutes occur during the summer and during the school year, and they are followed by integration of technology and IMMEX (Interactive Multi Media Exercises) problem-solving during the school year.



RECENT PROJECT ACTIVITIES

- During year one, the Fayette County IMMEX project, in partnership with UCLA, developed eight teams representing three high schools and six middle schools, which include teachers, students, and community partners. Teams attended a two-week summer training to learn how to construct eight IMMEX educational problem scenarios, which challenge students to investigate a problem and also provide them with the resources to develop, test, and refine hypotheses to arrive at complex solutions. These problem sets will be available to users across the country through the IMMEX website: www.immex.ucla.edu. Two additional middle schools joined the project during the second year, for a total of 10 participating schools. The schools continue to develop more problem sets, and are ahead of schedule in working toward the goal of completing 42 by September 2006.
- Plans are underway to incorporate IMMEX into the school district's annual Technology Fair and a district sponsored regional conference called the Technology Enhanced Classrooms (TEC) Conference.
- Presentations on the project have been given at the National Education Computing Conference, the National School Boards Association T+L2 Conference, the Kentucky Teaching and Learning Conference, and the Kentucky Association of Technology Coordinators.
- Two of the IMMEX Liaison teachers have received the National Science Foundation's Presidential Award for Excellence in Mathematics and Science Teaching.

WEBSITE

teach.fcps.net/immex/

Inquiry-based Marine Biotechnology and Bioinformatics for Teachers and Students

PRINCIPAL INVESTIGATORS

Dr. Simona Bartl
Moss Landing Marine Laboratories
Moss Landing, California

Dr. Henrik Kibak
California State University-Monterey Bay,
Seaside, California

PROJECT LOCATIONS

Monterey, Santa Clara, Santa Cruz,
and San Benito counties, California

ABOUT THE PROJECT

This comprehensive project for 30 middle and high school teachers (who will pass along their learning to 5,000 students) uses inquiry-based education developed from research projects at Moss Landing Marine Labs to teach biotechnology and IT skills. Participants learn how biotechnology is used to address scientific questions and how resulting data is analyzed, manipulated, displayed, and shared. Participants increase their abilities and confidence in the use of available bioinformatics resources, and learn technical skills that are transferable to other areas of IT as well as other subject areas.



RECENT PROJECT ACTIVITIES

- Summer workshops gave teachers an opportunity to work through the scientific process as researchers. Both the technology they were using and the way of working were new to the teachers, and they were very enthusiastic about both.
- Teachers did biotechnology and bioinformatics work. They extracted and cloned DNA and sent it off for sequencing. Then they performed bioinformatics analysis including sequence alignments, phylogenetics and protein modeling.
- Teachers created lessons that they could take back to the classroom to expose their students to—and get them excited about—the scientific process and potential career opportunities in the biotech field. To help teachers think concretely about using this material in their classrooms on an ongoing basis, project staff invited a guest teacher to speak about how he's used this material in his classroom. Follow-up meetings and classroom visits are planned to support teachers as they experiment with and tailor this content for their students.



WEBSITE

science.csumb.edu/~hkibak/ITEST/

ITEST Learning Resource Center

PRINCIPAL INVESTIGATORS

Joyce Malyn-Smith
Sarita Nair
Tony Streit
Education Development Center, Inc. (EDC)

PROJECT LOCATION

Newton, Massachusetts

ABOUT THE PROJECT

The national ITEST Learning Resource Center (LRC) at EDC collaborates with all of the ITEST Projects across the United States to achieve program goals, weave together promising practices, and leverage their combined achievements into new knowledge. The results will inform and guide formal and informal educators in planning, implementing, and evaluating IT-enriched STEM initiatives. The LRC collaborates to offer opportunities that connect youth-based and comprehensive ITEST projects, tightens the research-practice cycle, and creates a national presence for the ITEST program as a primary resource for learning about, experiencing, and using IT in STEM initiatives.

RECENT PROJECT ACTIVITIES

- Convened the first annual NSF ITEST Summit, which brought together principal investigators and their staff teams from all ITEST projects, along with NSF, to plan for our work together.
- With input from ITEST Projects, developed and implemented a Technical Assistance and Collaboration plan that provides opportunities for project staff—along with LRC staff and advisors—across the country to connect with one another to share expertise, information, and resources through online dialogues, publications, and conference calls.
- In collaboration with ITEST projects, established the ITEST website to disseminate information about projects, promising practices, and resources related to STEM education in formal and informal settings.

Learning Resource Center staff (clockwise from top left): Bethany Carlson, Stella Ogunor, Hae Jung Chung, Chris Lyons, Siobhan Bredin, Tony Streit, Cynthia Newson, Leslie Goodyear, Katherine Hanson, Monica Biswas, Vivian Guilfooy, Laura Breeden, Sarita Nair, Kerean Grant, Joyce Malyn-Smith, Wendy Rivenburgh

WEBSITE

www.edc.org/itestlrc



MAPTeach

Place-based Geospatial Learning and Applications in Rural Alaska

PRINCIPAL INVESTIGATORS

Timothy Olsen
Thomas M. Lillesand
Samuel A. Batzli
University of Wisconsin-Madison

De Anne S.P. Stevens
Patricia A. Craw
Alaska Division of Geological and
Geophysical Surveys

Jackie S. Fenno
University of Alaska-Fairbanks

PROJECT LOCATION

Multiple rural locations across Alaska



ABOUT THE PROJECT

With the support of 10 partner organizations, this comprehensive project fosters decision-making in rural communities regarding the sustainable use of natural resources by engaging participants in applying marketable geospatial IT research fluencies situated by culturally relevant contexts. One hundred sixty secondary students, mostly Native Alaskans, and 16 teachers, in regions characterized by poor standardized student test scores, high dropout rates, and struggling cash economies, work closely with scientists. By project end, 3,319 students, including 2,025 Native Alaskans, and 243 teachers, will have access to locally and culturally relevant geospatial IT curriculum facilitated by Web-served imagery, geographic information systems data, analysis tools, and field kits available for checkout.

RECENT PROJECT ACTIVITIES

- MapTEACH project work has been featured on Alaska public radio and TV, and most recently in “Sharing Our Pathways,” a newsletter of the Alaska Rural Systemic Initiative published by the Alaska Federation of Natives.
- Geological information gathering in the field coupled with the pilots of place-based curricular activities were carried out at the Old Minto Cultural Heritage and Education Institute and in the Nome and Council districts on the Seward Peninsula.
- Web-served geospatial information layers including satellite remote sensing images are being made deliverable via the Internet so that students and community members can locate their own local mapping data on the digital maps; such as global positioning system tracks that show trails, places of cultural significance, and geological features.

WEBSITE

www.mapteach.org

MyBEST

Mentored Youth Building Employable Skills in Technology

PRINCIPAL INVESTIGATORS

Keith Braafladt and Mary Ann Steiner
Science Museum of Minnesota

PROJECT LOCATIONS

Minneapolis and St. Paul, Minnesota

ABOUT THE PROJECT

The Science Museum of Minnesota's youth-based ITEST program engages inner city teens in creating a learning community for STEM education through creative technology projects led by adult professionals in sciences and the arts. Through a three-year series and cycle of festivals, workshops, and presentations, 200 participating teenagers—with special emphasis on girls, youth of color, and economically disadvantaged youth—in grades 7–12 engage in hands-on design and construction workshops integrating familiar materials, computer technology, electronics, and engineering while developing relationships with one another, the program staff, and adult mentors.

RECENT PROJECT ACTIVITIES

MyBEST is organized around a series of cycles for volunteers, as well as a summer internship program for youth who have participated in the program for at least a year. Each cycle includes a theme with a hands-on project, workshops with guest presenters, a field trip, a career workshop and a presentation or outreach. The *Summer 2004* program had three cycles to engage young people in creative uses of technology. The themes were:

- **Telescopes:** Youth learned how to make telescopes and manipulate light with mirrors and lenses, working with a museum exhibit prototyper. The youth then built three telescopes, giving one each to a Community Center in Landfall, Minnesota, to the Fort Worth Museum of Science and History's *DesignIT* program, and keeping one for the MyBest program.
- **Documentation:** MyBEST youth worked with an organization called Asian Media Access to develop skills in shooting and editing digital pictures and video. They documented an overnight camping trip to an artist's farm, where they built machines to throw paint. Back at the museum, they edited this footage into movies and posters to tell the story of the trip. *Dragonfly TV*, a PBS Kids program, also came out and talked with the youth about TV shows.
- **Musical Inventions:** Participants worked with a local composer who creates music from sounds in the urban and natural environment, who took them on an incredible sound tour of St. Paul. The youth then used tiny computers and sensors to design their own musical instruments that had some interaction with people and environment, which they presented in the museum's new science park exhibit, the Big Back Yard.
- **Internship themes** included a Sound Lab project, in which youth developed sound experiments to get high school kids who are into the arts interested in science programs; a Jitterbug team, in which youth did audience evaluation and research to determine directions for a hands-on visitor activity; and an Information Systems internship, in which a student worked directly with museum IS staff to assist them in various areas of their work.



WEBSITE

www.smm.org/mybest

New Mexico Adventures in Modeling

Integrating IT into the Curriculum Through Computer Modeling Approaches

PRINCIPAL INVESTIGATORS

Eric Klopfer
Massachusetts Institute of Technology (MIT)
Cambridge, Massachusetts

Ellen H. Goldberg
Santa Fe Institute
Santa Fe, New Mexico

PROJECT MANAGER

Susan Yoon
Massachusetts Institute of Technology (MIT)
Cambridge, Massachusetts

PROJECT LOCATION

Greater Santa Fe area, New Mexico

ABOUT THE PROJECT

Drawing on curriculum and software developed at MIT, this comprehensive project will develop key skills in an emerging area within IT with broad applications, while enhancing interest in IT and modeling the integration of IT into the curriculum. This three-year program trains 75 (25 per year) New Mexico science, mathematics, and technology teachers in grades 6–12 to integrate IT concepts and computer modeling—especially of complex adaptive systems—into their curricula, using StarLogo simulation software, participatory simulations that use handheld computers, and related computer technologies.



RECENT PROJECT ACTIVITIES

- Held a community event at the Santa Fe Children’s Museum for the community to learn about Complex Systems, including hands-on activities staffed by Adventures in Modeling (AIM) members.
- Piloted new versions of the StarLogo software and participatory simulations at the summer 2004 workshop.
- Found excellent candidates and participants for the 2004 workshop, including many who are starting large initiatives at their schools.
- Created an online video case study of StarLogo integration into the science classroom.



WEBSITES

education.mit.edu/aim
education.mit.edu/pda

Ocean Explorers GIS, IPA, and Ocean Science for IT Literacy and Skills

PRINCIPAL INVESTIGATOR

Steven D. Moore
Center for Image Processing in Education
Tucson, Arizona

PROJECT LOCATIONS

Santa Barbara, Ventura, and Los Angeles
counties, California

ABOUT THE PROJECT

The Ocean Explorers comprehensive project provides professional development, instructional materials, and software for up to 20 teams of three to five middle and high school teachers from California. Over a three-year period, each team will create IT-based learning experiences that directly support the attainment of national and state standards for STEM education. The learning experiences created by the teams will be tested during summer field experiences for students and during regular classroom sessions. A cohort of team leaders will be trained to be Ocean Explorers workshop leaders to continue the project's vision into the future.

RECENT PROJECT ACTIVITIES

- Conducted a series of workshops about GIS (geographic information systems) for teachers, using the *Mapping an Ocean Sanctuary* curriculum developed with previous NSF funding, and about image processing and analysis, using the *Ocean of Images* curriculum developed by the project.
- Took two groups of 20–25 teachers on summer trips to Santa Cruz Island (one of the Channel Islands), the first on a commercial vessel and the second on a research vessel. Participants spent four days at the University of California Reserve Field Station. Activities included training on LiMPETS (a coastal research protocol for volunteers and students developed by NOAA), a presentation from a Channel Island National Park scientist, and testing at the harbor. At the island, teachers used scientific water quality testing equipment, made sightings of marine animals, received instruction from Marine Sanctuary staff, and collaborated with an ocean-ographer. As a culminating event, the teachers did a GIS project, using GIS software to show the geography of the trip.



WEBSITE

www.exploreoceans.org/

Salmon Camp Research Team

A Native American Technology Research and Science Career Exposure Program

PRINCIPAL INVESTIGATORS

Travis Southworth-Neumeyer

Dan Calvert

Oregon Museum of Science and Industry (OMSI)
Science Camps

PROJECT LOCATIONS

Oregon, Washington State, and California

ABOUT THE PROJECT

OMSI's Salmon Camp Research Team is a youth-based advanced technology and natural science career exposure and training program offered in a year-round, multi-year format. It annually serves 180 reservation, rural, and urban secondary school students with Native American community affiliations and very low representation in IT-related career fields. The students work with researchers on computer modeling of complex ecological, hydrological, and geological problems. They work directly with university, tribal, and agency scientists, researchers, and natural resource managers, using advanced technologies to facilitate salmon recovery efforts and mitigation of geologic hazards that may significantly impact salmon and human populations.

RECENT PROJECT ACTIVITIES

The students worked with a variety of tribal groups and public agencies such as the Forest Service, the National Park Service, U.S. Fish & Wildlife, in addition to a number of state and local agencies on ecological restoration projects in Oregon, Washington, and California. The students were able to work with scientists in order to gain an understanding of complex, multi-faceted ecological concepts through hands-on experience and the use of GIS, GPS, and IT computer modeling. The program also focused on incorporating traditional management practices with western science.

Participated in a variety of very progressive management schemes including:

- Rehabilitation of a 35,000 acre parcel in Central Oregon, that could dramatically affect land use policies throughout the western U.S.
- Collecting field data contributing to large scale vegetative restoration projects in the Redwoods.
- Using GPS technology to assist U.S. Forest Service archeologists with surveying culturally significant sites in Central Oregon.
- Working with resource managers on salmon mitigation projects, including fish passage and habitat restoration on rivers throughout the Pacific Northwest.



WEBSITE

www.omsi.edu



MORE INFORMATION

<http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf04611>

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