

"The principal goal of education is to create men and women who are capable of doing new things, not simply of repeating what other generations have done."

Jean Piaget

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Center for Educational Technologies
Washington, DC, office

Nitin Naik, president
Center for Educational Technologies

2003 Annual Report Staff

Janet Boyle, Ghost Writers LLC

Kathleen Cox, graphic designer

Sean Duffy, intellectual property coordinator

Victor Hernandez, senior educational researcher

Jennifer Kirby, assistant educational researcher

Judy Martin, implementation research coordinator

Steven McGee, senior educational researcher

Debbie Reese, educational researcher


Don Watson, manager, video support services


Janis Worklan, curriculum writer, editor


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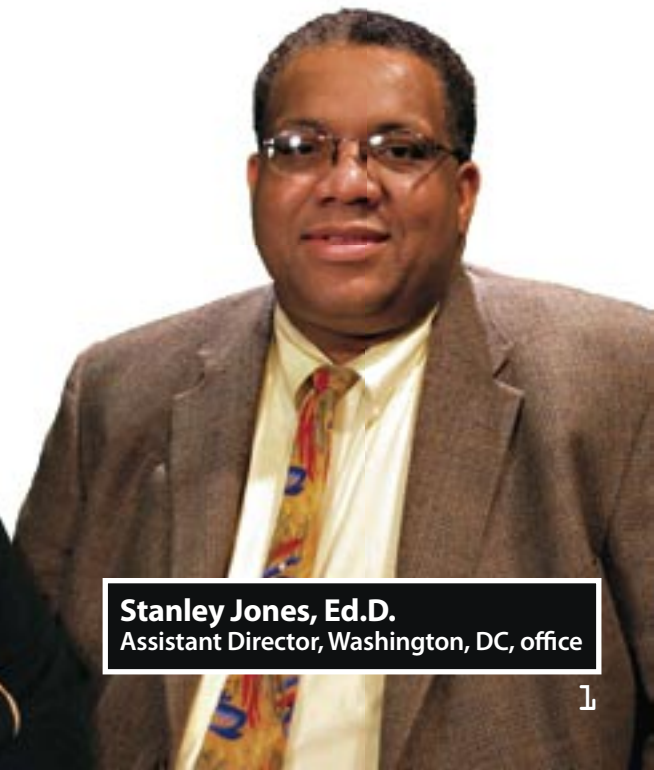
Center for Educational Technologies® Officers



Nitin Naik, Ph.D.
President



Jeanne Finstein, Ed.D.
Assistant Director



Stanley Jones, Ed.D.
Assistant Director, Washington, DC, office

The Erma Ora Byrd Center for Educational Technologies® was created in 1994 with initial funding from the National Aeronautics and Space Administration (NASA). The center is located on the campus of Wheeling Jesuit University in Wheeling, WV. Wheeling Jesuit University was founded in 1954 as one of America's 28 Jesuit institutions of higher learning.

The center administers the Classroom of the Future™ program, NASA's premier research and development program for educational technologies. The Classroom of the Future program began in 1990 and remains the central program within the center. Its goal is to develop and conduct research on technology-based learning materials. Resulting materials challenge students to solve problems by using datasets and other information resources. These resources are provided by NASA's five strategic scientific enterprises: aerospace technology, biological and physical research, Earth science, spaceflight, and space science.

Over the years the center has expanded its funding base to increase the scope of its activities in research and evaluation, curriculum development, professional development, and outreach and dissemination. The center's success is the product of its highly qualified group of professional, technical, and administrative staff. In 2003, 47 full-time staff contributed to work at the center. These people have expertise in software and content development, research, publications and support, computer support, and video support. They contributed to product development, professional development, research and evaluation, and educational outreach. The center draws upon interdisciplinary expertise to accomplish the goals of its multiple activities.



Dear Friends,

Tackling problems with creative audacity.

That's the NASA approach. It's the forward-thinking path that has put man on the moon, built a permanent station in space, and made realistic a goal to have mankind one day visit Mars.

As a key partner to NASA, the Center for Educational Technologies® steers that same cutting-edge course.

That charge took on even more importance in 2003 as NASA elevated the role of education within its mission. Education now joins NASA's five science and technology areas as a strategic enterprise.

The Center for Educational Technologies is well positioned within this new NASA. Our relationship with NASA has given us a unique perspective. We have created an organization aligned with NASA's culture. NASA has put people on the moon and sees into the far reaches of the universe.

We push similar frontiers, using the latest cognitive research and emerging educational technologies to advance learning. We are a one-stop shop for educational products, services, and research. This annual report highlights efforts that exemplify those three main thrusts. For example:

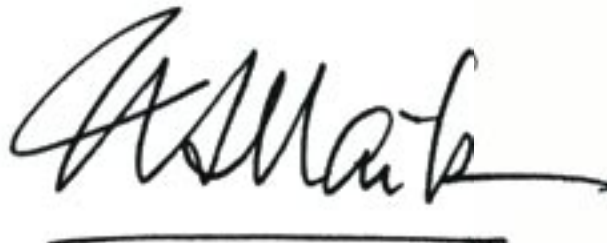
The **Foundations of Freedom™ DVD** engages students in authentic history research, using primary resources related to the Constitution. This product meets the needs of the U.S. Department of Education's increased emphasis on history education. It's also an example of how we continue to extend our culture to meet the needs of other agencies and organizations beyond the boundaries of science disciplines.

The **Virtual Design Center** makes certain that new designs for classroom investigations are based on good science and solid educational design theory.

The **Mid-Atlantic Region Space Science Broker (MARSSB) program** connects space scientists with educators to enhance science and math education.

InSTEP™ marries the success of problem-based/inquiry learning with the newest classroom technology to provide teachers with the tools and training they need to promote student learning.

Our culture at the Center for Educational Technologies allows us to solve urgent problems. We also look to the future to anticipate emerging challenges, such as those arising from the No Child Left Behind initiative. We explore new paradigms of instruction, new technologies, and new theories of learning to meet those challenges. And as the center's 2003 activities show, we stand ready to continue changing the way people learn.



A handwritten signature in black ink, reading "Nitin Naik". The signature is written in a cursive, flowing style. Below the signature is a horizontal line.

Nitin Naik, president





Motivating Students to Study the History of the Constitution

Dry. Boring. Irrelevant. Typical responses from teenagers describing the history they have to study in school. Experts have long debated the best way to interest students in American history—and especially in the study of the U.S. Constitution, arguably the foundation of American freedom.

To that end the Center for Educational Technologies® has created the Foundations of Freedom™ DVD. This innovative multimedia curriculum supplement is designed to engage high school students in a study of the Constitution with a dynamic problem-based learning approach. Every high school in the country will receive a free copy of this DVD once it's completed in early 2004.

Foundations of Freedom is grounded in relevant research and theoretical foundations with particular emphasis on problem-based learning. Research suggests that students will work on problems when they think the problems are meaningful or relevant. With this in mind, Foundations of Freedom was developed on the theory that students will try to gather information on their own when presented with a challenging situation they do not readily understand.

Besides being more interesting to students, problem-based learning can help students develop research and critical thinking skills as they investigate constitutional issues. Program designers worked with outside subject matter experts to determine content and with teachers to identify the best ways to present the material to students.

Another key feature of this multimedia program is how it integrates various topics into appropriate themes and challenges to elicit student interest and engagement.

Dr. John Baro
Foundations of Freedom™ Project Manager





Foundations of Freedom™ focuses on 12 significant events in the history of the Constitution. These events challenge students to draw conclusions about issues such as woman suffrage, judicial review, the War Powers Resolution, and the court packing crisis of 1937.

In addition, the program emphasizes the use of technology as a tool to facilitate teaching, learning, and assessment. Foundations of Freedom includes an extensive archive with all the research material students need to investigate challenge questions for each of the 12 events.

Dr. John Baro, who manages the Foundations of Freedom project, said the presence of primary source material within the DVD is significant.

“There is no other collection of reference documents like this,” Baro said. “The DVD contains more than 1,000 images, documents, and movies on the Constitution, everything from the Federalist Papers to landmark Supreme Court cases, letters, essays, and newspaper articles—everything a student needs.”

The DVD introduces each issue with a documentary-style video segment. There are also more than 400 video clips of interviews with leading scholars, historians, and legal experts. Text supplements the videos. The material is fully cross-referenced and searchable.

Teachers who have previewed and used the program found the content in line with relevant state and national standards and have endorsed it enthusiastically. “It’s revolutionary,” one Virginia teacher said. “I’ve never seen anything like it before.”

“It’s fantastic. It’s qualitative and quantitative,” a Texas educator reported. A Pennsylvania teacher proclaimed the curriculum excellent. “It creates a passion for government. It gets to the heart of some of the issues and gets away from rote memorization of facts.”

Many teachers have commented on the breadth of the primary source material included in the DVD. “As a history geek, I like the wealth of information,” one teacher said. “There’s not a single other resource available to teachers that has this level of sophistication.”

A West Virginia high school teacher likes the way the material is organized. “The format is very intelligent and alluring. It makes learning fun and attractive,” he said. A number of teachers called the project a great supplement to any history or government curriculum.

In an effort to strengthen Foundations of Freedom, the Center for Educational Technologies contracted with outside researchers to use and study the program to learn about its impact on student learning. One researcher found that the program’s metaphors help students organize their experience. Others are studying the development of historical thinking, the effects of scaffolding a peer-challenge strategy on students’ argumentation skills and learning, and the ways Foundations of Freedom can help students see that historical inquiry involves considering multiple perspectives to any given event.

Foundations of Freedom was developed with funding from the U.S. Department of Education as part of an initiative of U.S. Sen. Robert C. Byrd of West Virginia to restore history to a prominent place in American schools. www.cet.edu/constitution



“There’s not a single other resource available to teachers that has this level of sophistication.”

Michael Taylor
Turner Ashby High School
Bridgewater, VA



THE BIG PICTURE

Virtual Design Center Marries Good Science, Solid Theory

Most of us spend a dozen years in elementary and high school, and many add more years of college and graduate school—a huge investment of time, effort, and resources. Despite all those years in the classroom, most remember very little of the actual content presented in class. Research shows that people tend to remember the mostly “big ideas.”

Our brains organize information around these big ideas. The education reform movement, national education standards, and problem-based/inquiry learning environments all have been created to help students understand big ideas. And the Virtual Design Center, a project of the Center for Educational Technologies®, is helping scientists, educational researchers, and technology designers get these big ideas across to students.

NASA sponsors the Virtual Design Center to stimulate development of research-based instructional technology and classroom activities. Enhancing science, math, and technology education has become a NASA priority as the agency seeks to develop the knowledge, skills, and experience of teachers and capture student interest in these subjects.

NASA wants to be certain that the education products it develops really do help students learn. The Virtual Design Center uses NASA resources to ensure that new designs for classroom investigations are based on good science and solid educational design theory.

Inquiry-based learning has been shown to improve students' attitudes toward science, science process skills, and scientific problem solving. Curricula and other educational products that meet sound principles for inquiry-based learning will be eligible to earn a Virtual Design Center seal of approval. To earn this mark, NASA design teams must work through a rigorous six-step process to demonstrate that the technology can help students meet national science standards.

The Virtual Design Center is the brainchild of Dr. Steven McGee, senior educational researcher at the Center for Educational Technologies. It is fully supported by Dr. Shelley Canright, NASA educational technology and products program executive. McGee guides the project, designed to

provide K-12 teachers with relevant programs and products based on NASA engineering and science themes and resources. “The Virtual Design Center fills an important niche to help designers understand the latest discoveries from the learning sciences,” McGee said. “Research results are organized in the form of design principles that can be readily implemented without forcing designers to comb the academic journals.”

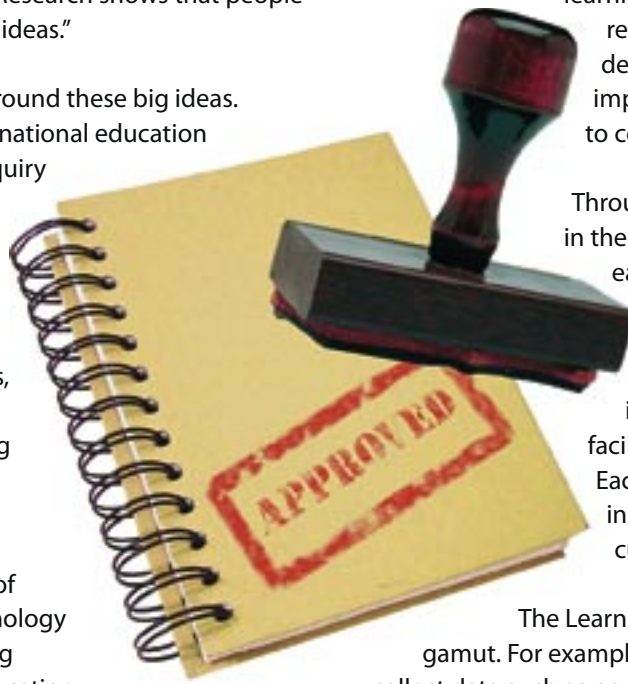
Through 2003, 14 designers had enrolled in the Virtual Design Center. Additionally, each of the four NASA research teams awarded Phase 2 funding within NASA's Learning Technologies Project was scheduled to design an inquiry-based classroom investigation facilitated by the Virtual Design Center. Each team's design must demonstrate an instructionally sound application for a cutting-edge learning technology.

The Learning Technology projects span a wide gamut. For example, one project allows students to collect data such as population growth and project that data over a virtual, on-screen, mouse-manipulated, three-dimensional Earth.

Another project supports visually impaired learners, helping them to conceptualize mathematical equations by translating graphs into sonic representations.

A third project, the Virtual Laboratory, simulates the look and functions of sophisticated scientific instruments used in NASA science and exploration missions. Educational applications will introduce K-12 students to the art and craft of using these instruments and NASA data to solve problems. Kennedy Space Center's Berta Alfonso manages the development of this and other educational tools and resources for students and teachers.

“By partnering with the Center for Educational Technologies, the Virtual Lab team will have access to the latest research in the field,” Alfonso said. “As an educational product, Virtual Lab must accurately capture the educational requirements early in the design process to ensure the usefulness of our product. With the center's workshops and guidance, we are sure to develop a more effective learning tool that addresses the needs and interests of today's teachers and students.”



"With the CET's workshops and guidance, we are sure to develop a more effective learning tool that addresses the needs and interests of today's teachers and students"

Berta Alfonso
Virtual Laboratory Project Manager
Kennedy Space Center

Dr. Debbie Denise Reese, an educational researcher at the Center for Educational Technologies and Virtual Design Center team member, believes there's no limit to the possibilities for using NASA technology, scientists, and resources to help students learn math, science, and technology. She stresses that the Virtual Design Center is also a forum for groundbreaking research and a source for research ideas to test curriculum design principles.

Although there are many instructional design theories and models, the Virtual Design Center prescribes only theories and models supported by empirical research. It also provides funding for education scientists to test design theories and models. As these researchers complete their work, the Virtual Design Center will showcase new "big ideas" that apply learning theories to instructional technology and classroom environments for promoting scientific inquiry in K-12 students.

www.cotf.edu/vdc



Dr. Steven McGee
Virtual Design Center Project Manager



Top photo: These Kennedy Space Center employees are working with the Virtual Design Center as they design the Virtual Laboratory, a project that lets users work in a simulated environment with the instruments NASA uses on science and exploration missions. From left are Bill Little, Mark Moxley, Berta Alfonso, and Gregg Buckingham.

Bottom photo: This screen capture from the Virtual Laboratory shows what users might see through an electron microscope.



MAKING THE CONNECTION

PROGRAM BRINGS TOGETHER SCIENTISTS, EDUCATORS

"We consider populations that are not currently connected to NASA outreach activities, particularly space science, and introduce opportunities to them."

Dr. Laurie Ruberg
MARSSB Project Manager



Matchmaker, matchmaker, make me a match.

While the professional outreach staff of the Mid-Atlantic Region Space Science Broker (MARSSB) program isn't dabbling in matrimonial matters, it still serves just as important a duty. It connects space scientists with educators.

"We're matchmakers," said Dr. Laurie Ruberg, project manager. "We look at situations in which educators have a science, math, or technology-related need and determine where the wonders of space science can provide an exciting context for filling that need and stimulating learning."

The space science brokers reach out to Mid-Atlantic region K-12 teachers as well as those in community colleges and four-year institutions. Most educators with whom they have connected recognize a definite need to enhance science and math education. "Space science is an excellent way to get students interested in math, science, and technology," Ruberg said, since most kids are fascinated by the topic.

Involving minorities and other underserved groups is an important aspect of the brokers' work. "We consider populations that are not currently connected to NASA outreach activities, particularly space science, and introduce opportunities to them," Ruberg said. These opportunities include state and regional math, science, and technology conferences as well as research funding prospects. "We make an extra effort to contact schools that traditionally serve minorities and those that have not been in the loop with NASA, we introduce them to resources and provide them an invitation to be a part of NASA's space science discoveries and missions."

The space science brokers also encourage scientists to apply for educational grants. Every year a portion of the funding available for educational outreach goes unused. At the college level the brokers help faculty apply to participate in entry-level NASA research. There is also funding to support university scientists' collaboration with area museums or elementary and high schools, to develop space science exhibits, events, or curriculum products.

For example, MARSSB recently used space grants to stage workshops for teachers to help them make the Mars mission come alive for their students. As a result, many schools offered activities that enabled students to use information transmitted from the Mars global surveyor to propose a landing site for the Mars rovers. Other students got the chance to operate Cornell University robots that are similar to the Mars rovers. Because many space missions are robotic, students have a number of opportunities to build and remotely control robots and get involved in engineering and robotic competitions sponsored by NASA and the National Engineering Society.

In 2003 the MARSSB broker team facilitated more than 50 events in its region, which comprises nine Mid-Atlantic states plus the District of Columbia. The events were as diverse as teaching students how to create scale models of the solar system to sharing space science profiles with the National Society of Black Physicists.

Space science brokers also responded to more than three dozen requests from scientists at research institutions, historically black colleges and universities, and NASA centers seeking assistance in developing Office of Space Science-supported funding.

The MARSSB broker team works through the Center for Educational Technologies®, but as a space science broker, each team member is in a position to promote resources other than those available through the center.

“We look at all of what space science has to offer and find the best fit for an individual’s needs. That’s very powerful,” said Dr. Stanley Jones of the Center for Educational Technologies’ Washington, DC, office. “This has helped us to work with groups we haven’t worked with before, both locally and regionally, getting our message out to more people that NASA has many tools to meet people’s funding and training needs.”

MARSSB has created an impressive dialog within the region it serves and within NASA. Being part of the project has enabled Ruberg and other team members to connect with different groups at NASA, giving the center a more diverse relationship across the agency. marrsb.cet.edu



Top photo: MARSSB served as the lead coordinator for the Marsapalooza education and public outreach event in 2003.

Bottom photo: Students from Anne Beers Elementary in Washington, DC, attend a Marsapalooza presentation sponsored by MARSSB at the United States Naval Observatory. Students learned about the Mars Exploration rover mission. Photos courtesy of Dr. George Carruthers.



InSTEP TIME

Makes Teachers 'Guide on the Side'

Public concern about student achievement in mathematics and science has led many to question the quality of teaching across the nation. Research has shown that teaching and learning grounded in problem-based and inquiry-based activities and facilitated by technology tools combine to effectively promote student learning.

There's one problem, though. For many teachers current technology was not in place when they were in school. Thus, understandably these teachers might avoid or even fear it. They need hands-on experiences to bring their comfort level close to that of their students. The challenge is to create professional development opportunities that let them experience both problem-based learning and the newest classroom technology tools.

In response to this challenge, the Center for Educational Technologies® has been offering the InSTEP™ professional development program for West Virginia teachers since 2001. InSTEP stands for Integrating Science and Technology in Educational Practice. In the program's first three years, it has welcomed hundreds of teachers to weeklong summer

workshops at Wheeling Jesuit University and in communities around the state, modeling problem-based teaching methods while offering technology integration strategies. In 2003 nine summer workshops were offered to teachers in West Virginia. Six were conducted at the center and three in Southern locations to facilitate the participation of teachers in underserved areas. A total of 432 teachers participated in InSTEP summer workshops in 2003.

Kathleen Norris, InSTEP program manager, said that InSTEP helps West Virginia math, science, and technology teachers help students learn by doing, by accessing prior knowledge, and by developing problem-solving skills.

Unlike the traditional classroom in which a teacher lectures and children memorize answers, problem-based learning features the teacher as facilitator. The students work together to find answers. In effect, the teacher becomes the guide on the side, rather than the sage on the stage, Norris added.

Teachers who come to InSTEP workshops choose a technology tool (such as a digital camera, handheld computer, global positioning unit, or a software package) and learn the best ways to use the tool in their classrooms.



Top photo: Students learn and practice Graffiti in order to input data on their Palm™ handheld computers.

Bottom photo: A student at the West Virginia School for the Deaf and Blind discovers how helpful the handheld device can be when placing an order.



Kathleen Norris
InSTEP Project Manager

"This program was probably the best conference I have attended in my 18 years of teaching."

InSTEP participant

As a result of InSTEP participation, teachers at the West Virginia School for the Deaf and Blind, for instance, taught their hearing-impaired students to use handheld computers to communicate with people who don't know sign language. The students were thrilled to use technology to send digital valentines to parents and schoolmates and to order their own lunches at McDonalds—small tasks for most children, but truly life-changing events for children with hearing impairments.

InSTEP multiplies the impact of its programs by encouraging teachers to share what they have learned with 5-10 other teachers. InSTEP teachers earn a stipend for facilitating InSTEP workshops back in their home school. In this way, InSTEP has equipped more than 4,000 teachers with progressive teaching approaches, and these teachers have passed their knowledge on to their students.

When teachers are energized and enthusiastic about their subject material, the students can't help but get excited. After completing the InSTEP workshop, a Beckley science teacher had her freshman students teach atomic theory to fifth- and sixth-graders. As they tested the conductivity of metals, the older and younger students were so engaged that they tested every metal in sight, including the younger students' braces—while the braces were still in the kids' mouths!

Teachers who see this kind of reaction are eager to learn more. They can return to InSTEP and complete a series of two additional workshops, choose other tools, study more in depth, and actually construct a problem-based learning scenario to support their instructional design. If they return for a third year, they conduct peer reviews and create instructional designs that will become part of the InSTEP web site to serve as a resource for other teachers. Developing teachers' skills to plan for classroom implementation and write curriculum is an important aspect of the center's philosophy on improving professional competency, as is the multiple year commitment to professional development that the InSTEP program fosters.

Teachers have overwhelmingly found InSTEP valuable and have highly recommended it to colleagues. "This program was probably the best conference I have attended in my 18 years of teaching," said one InSTEP participant. Equally important, InSTEP research shows conclusively that the workshops are enhancing teachers' technical skills and changing their attitudes toward technology. instep.cet.edu





At the Center for Educational Technologies® we are committed to enhancing lifelong learning and teaching through the effective use of technology. As learning technologies continue to evolve at a rapid pace, the center's core work and expertise directly align with important educational needs, quality, and theoretical requirements and are supported by highly qualified interdisciplinary teams. Our work falls under three main categories: products, research, and services.

The center builds upon the learning sciences to design and conduct research and evaluation of curriculum, teaching, learning, and assessment practices. Resulting knowledge serves as the basis for the development of curriculum supplements for use in K-12 schools. In turn, both research and evaluation knowledge and curriculum supplements are used for designing and implementing professional development for teachers and school administrators.

The center's work and expertise are further extended through multiple collaborative outreach and dissemination efforts with the educational community, federal agencies, state agencies, and industry to make education reform efforts a success.

To ensure the quality of the center's projects and activities, we have established a dynamic group of professionals representing and providing important contributions to these core areas of work and expertise.

PRODUCTS

Teachers and schools need curriculum materials that engage students in provocative questions that allow students to better understand the world around them. To meet this challenge, the center develops curriculum supplements that spur students to solve problems and think critically. We use problem-based/inquiry approaches to teaching and learning to accomplish this.

Typically, curriculum products promote recognition of problems and hands-on experimentation, data collection and analysis, justification of methods, and writing and communication of findings. We take a different approach. The design and development of our curriculum products are generally guided by four important factors:

We ground our curriculum development in relevant research and theoretical foundations.

Our curriculum products typically are integrated and interdisciplinary. This way they can be used in a variety of relevant courses. Students study problem situations and create potential solutions beyond only mathematics, science, and technology applications.

We emphasize technology as a tool to facilitate teaching, learning, and assessment. Our products are available in a variety of media formats to allow for maximum access.

Our curriculum content is in line with relevant state and national standards.

RESEARCH

What knowledge and strategies are necessary to enhance complex problem solving and keep learners engaged? How can students use visualization and modeling environments to develop concepts? What activity structures support complex problem solving within the classroom and in informal settings?

These and other important questions guide the research and evaluation work conducted by the Center for Educational Technologies. Using the learning sciences as the foundation for this work, we primarily seek to understand the conditions under which learning takes place. We consider theories of cognition, applications of theory to practice, and technology-rich learning environments. And we use rigorous and objective approaches to inquiry and data collection.

Our goal is to produce valid and reliable knowledge in our core areas of interest. We rely on research designs that put students, teachers, programs, or activities in different study conditions. This approach lets us compare within and across conditions. We also typically use qualitative techniques for data collection. These generate complementary descriptive information to add detail, clarity, and explanatory quality to quantitative results.

SERVICES

The Center for Educational Technologies understands the important role of teacher quality and its connection to improving student achievement. Our professional development efforts target preservice and in-service teachers. We help them integrate and apply technology-based tools and problem-based/inquiry approaches. The result is better learning and teaching in K-12 schools and postsecondary settings.

Our professional development follows six principles that have a positive impact on teacher learning:

We create teacher networks, which facilitates broad changes in teacher practice and the use of technology.

We require follow-up work for an entire year and in some instances, multiple years.

We promote the participation of groups of teachers from the same school, grade, or discipline.

We focus on both what and how to teach, with primary emphasis on problem-based learning and integration of technology into teaching and learning activities.

We engage teachers during professional development activities in planning for classroom implementation and developing curriculum writing and presentation skills.

We require participating teachers to pass on what they have learned to other teachers as a way of promoting sustained change in schools.

Another key service thrust of the Center for Educational Technologies is educational outreach. We search for ways to bring the science and education communities together to build synergy and support regional collaboration in projects of mutual interest.

The center's primary outreach goal is to share information about NASA educational resources and opportunities and bring space science materials to schools, universities, and museums everywhere. We're also interested in promoting greater awareness of NASA resources and educational opportunities among students and scientists who have traditionally been underrepresented in science, technology, mathematics, and engineering fields.

Our educational outreach and dissemination efforts are facilitated through a brokering approach. We identify resources and events of interest and help scientists, schools, and other groups find ways to access resources and/or get involved in such activities. To complement these efforts, we also support the dissemination of NASA's educational materials and demonstrations of educational technologies that enhance science, mathematics, and technology curricula. Through this work the center seeks to create awareness about NASA's missions and research as well as NASA's commitment to education.

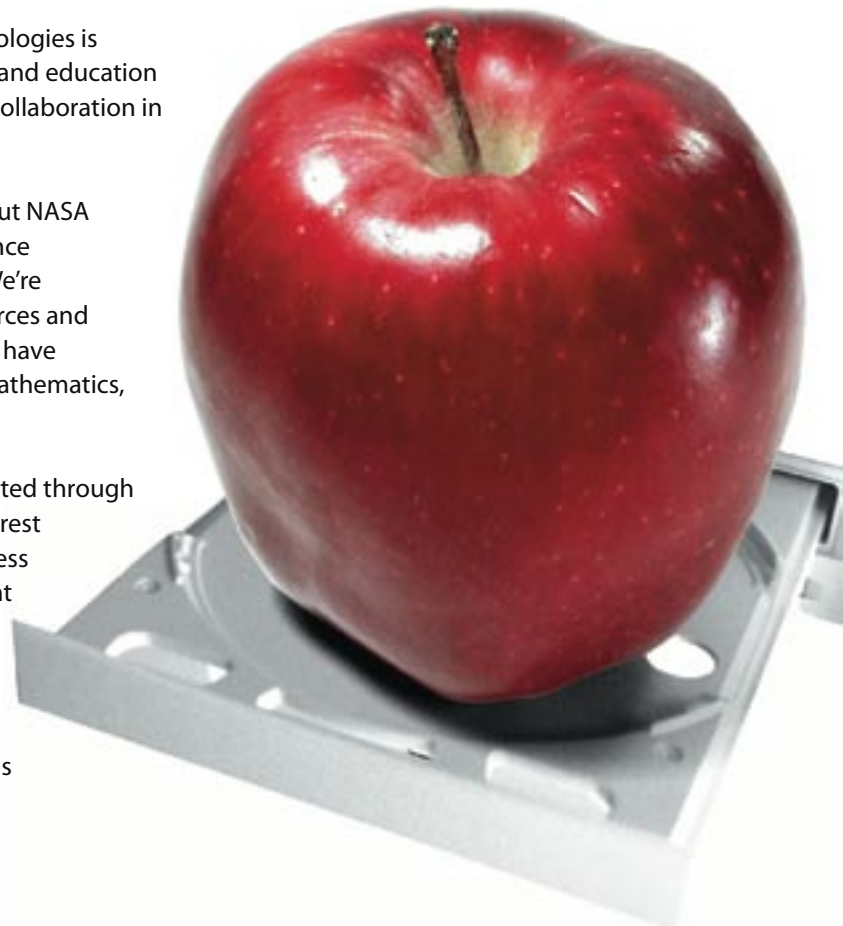
GOALS

Develop, evaluate, and disseminate new applications that integrate advanced technological tools, authentic content, and instructional pedagogy.

Demonstrate the effectiveness of digital content materials in targeted learning environments.

Develop, evaluate, and disseminate models of extended professional development related to the integration of technology into inquiry-based teaching and learning. These models include web-based, face-to-face, and school site mentoring experiences.

Advance understanding of the conditions of learning by considering theories of cognition, applications of theory to practice, and technology-rich learning environments.



Current PRODUCTS

Coal Impoundment. The Center for Educational Technologies® is working with the National Technology Transfer Center to develop tools for public information concerning Appalachian coal impoundments. These impoundments are a natural result of the mining process. As a general practice, waste materials from the mine are placed in earthen impoundments, resembling earthen ponds. On some occasions the impoundments have broken, with a loss of human life and destruction to property. This project seeks to identify the impoundments and provide information about them to the general public. Evacuation plans, if available, are provided along with this information. We will be developing problem-based activities for students and a training program for the general public, including emergency personnel. Funding source: U.S. Department of Labor and the Mine Safety and Health Administration. www.coalimpoundment.com

Exploring the Environment®. Exploring the Environment seeks to demonstrate the use of NASA's remote sensing databases in educational settings. This project provides K-12 schools free access over the Internet to environmental Earth science materials that use satellite images as tools for student research. Modules engage students in problem-based activities requiring them to formulate problem statements, collect and analyze data, then prepare and present their findings. The two modules undertaken in 2003 ask students to investigate the worldwide destruction of coral reefs and issues related to coal impoundments. Funding source: NASA. www.cotf.edu/ete

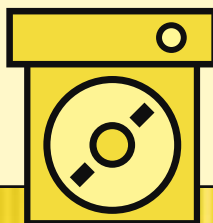
Journey to El Yunque. This bilingual (English/Spanish), middle school, web-based learning environment is being developed to allow students to investigate the effects of Hurricane Georges on the Caribbean National Forest, commonly known as El Yunque. It is designed to improve students' understanding of ecosystem environments along with their scientific inquiry abilities. The web site will provide teacher support materials and a standard workshop structure for professional development. It will also provide parent support pages and activities to facilitate interaction between students and their parents. Funding source: National Science Foundation. elyunque.cet.edu

NASA Portal. The center has provided support in developing the NASA portal. This revised web site satisfies one of the key items in President Bush's agenda, that is to provide citizen-focused information and services. The portal integrates all of NASA's web sites into a single portal, delivering electronic services and information to the public, partners, suppliers, key stakeholders, and internal employees and teams that execute NASA missions. One of the key functions of the portal is to provide a gateway to NASA information. The information spans more than 4 million pages. The primary focus is to concentrate on the section dealing with information and services for children, students, and educators. This initiative makes the NASA web more accessible, community focused, and useful to all of NASA's diverse audiences. It increases the scope and level of corporate and shared electronic services. Funding source: NASA. www.nasa.gov

Get InSTEP with Lewis and Clark: Exploring the Possibilities™. Developed by the Project InSTEP™ team at the center, the Lewis and Clark journey of 200 years ago provides the launch point for the needs of the 21st century educator. It touches upon technology-enhanced learning, standards-based curriculum, multisensory and hands-on activities, problem-based learning, multidisciplinary content in four major areas (science, geography, history, and the arts), and videoconferencing. Funding source: West Virginia Humanities Council. lewisclark.cet.edu

International Space Station (ISS) Challenge™. The ISS Challenge draws upon International Space Station design, construction, human exploration, and research as a vehicle to capture student curiosity. Its curriculum modules feature uncertainties and challenges that have emerged with the development of the space station, allowing each module to engage student interest by presenting a related real-world problem. Students must use and practice their science, math, technology, geography, and communications skills to solve each problem. Funding source: NASA. www.cet.edu/iss

STORM-E. This student-centered weather simulation immerses middle school students in standards-based content materials while encouraging teamwork and the application of knowledge. Students study general and specialized meteorological information so they can serve as experts in air pressure, humidity, temperature, and wind during a live event. The event is a videoconference connecting the students to the Center for Educational Technologies. Students make and update weather predictions based upon weather-related data. Funding source: NASA. storme.cet.edu



Current SERVICES

Integrating Science and Technology in Education Practice.

InSTEP™ workshops enhance teachers' understanding of constructivist learning principles, cooperative learning, problem-based learning, alternative assessment, and technology—leading to effective classroom integration and implementation. InSTEP consists of a four-year sequence of workshops and mentoring. Educators who complete the sequence are equipped to serve as technology and problem-based learning leaders within their educational communities. Funding: U.S. Department of Education. instep.cet.edu

Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Mexico: Problem-Based Learning.

The center conducts problem-based learning workshops followed by on-site training and support for the ITESM, a university system of 30 campuses around Mexico. The workshops acquaint faculty with the theory behind problem-based learning, model it to the instructors, coach them during practice, and provide feedback. Funding source: ITESM.

Earth System Science Education Alliance (ESSEA).

ESSEA provides teacher professional development in Earth system science through a systematic, five-year program that distributes cutting-edge graduate courses to 25 colleges and universities. The online courses address the needs of K-12 teachers in content, technology, educational resources, and new materials. The ESSEA team at the center and the Institute for Global Environmental Strategies support participant institutions' execution of ESSEA courses. Funding source: NASA and Lockheed Martin. www.cet.edu/essea

Summer High School Apprentice Research Program (SHARP) Joint Program Activity and Production of Promotional Video.

SHARP is a NASA education program managed by Modern Technology Systems Inc. (MTSI). It provides traditionally underrepresented rising high school juniors and seniors with an opportunity to develop and strengthen their research techniques as well as their written and oral communication skills, particularly in science, mathematics, engineering, technology, and geography. This program operates during the summer months at participating NASA field centers and selected colleges and universities across the country. The joint program activity conducted by the center for SHARP was a student-centered research project requiring groups of eight or nine students to investigate a hypothesized NASA mission to Mars. Students then had to produce a research proposal. Also, our Video Support Services department completed the new NASA SHARP promotion and recruitment video. Funding: MTSI through a contract with NASA. www.mtsibase.com/sharp

Cuyahoga Valley Environmental Education Center (CVEEC).

CVEEC workshops introduce teachers to problem-based learning, Earth system science, and the integration of technology into their classrooms. This initiative targets an expanding group of Summit County, OH, teachers who have an interest in sharing and improving their instructional practices, using various technology tools to support them. Funding source: GAR Foundation.

Educator Resource Center.

The NASA Educator Resource Center at the Center for Educational Technologies® provides instructional products and demonstrations of educational technologies that enhance science, mathematics, and technology curriculums. These resources reflect NASA missions and research as well as NASA's commitment to education. Funding: NASA.

Mid-Atlantic Region Space Science Broker Program (MARSSB).

The Mid-Atlantic Region Space Science Broker serves as a regional point of contact for scientists and educators seeking information or involvement in the Office of Space Science Education and Public Outreach program. The mid-Atlantic region is made up of Delaware, Kentucky, Maryland, New Jersey, New York, Ohio, Pennsylvania, Virginia, West Virginia, and the District of Columbia. Funding source: NASA. marssb.cet.edu



Current RESEARCH

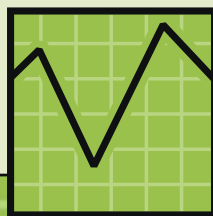
Integrating Science and Technology in Education

Practice. InSTEP™ professional development activities seek to help West Virginia teachers integrate technology into problem-based/inquiry approaches to teaching and learning. InSTEP's quality and impact are being evaluated in the context of changes in teaching practice that reflect increasing promotion of analytical thinking and problem-solving skills in mathematics and science. The design of the evaluation is guided by the following question: Does teacher participation in InSTEP professional development activities have an impact on teaching practice? Funding: U.S. Department of Education. instep.cet.edu

NASA Explorer Schools. The Explorer Schools program is a three-year partnership between middle schools and NASA. School teams will develop and implement action plans to promote the use of NASA content and programs as a means to address the teams' local needs in mathematics, science, and technology. Fifty NASA Explorer School teams kicked off the program in 2003. A question of interest is whether participation in the program leads to accomplishment of the program objectives. The evaluation combines design experiment methodology and scientific-based research strategies to measure program effectiveness. Funding: NASA. explorerschools.nasa.gov

Virtual Design Center. The Virtual Design Center is a web-based resource that guides development of inquiry-based educational products through consideration of theories of cognition, applications of theory to practice, and technology-rich learning environments. Currently, the center serves members of the NASA community involved or interested in designing online learning experiences. Working through the Virtual Design Center, designers specify investigations that use NASA resources and address NASA Enterprise themes to prepare students to meet national and state science standards as measured by standardized state and national tests. Funding source: NASA. www.cotf.edu/vdc

Evaluation of the Classroom of the Future's Curriculum Products. The No Child Left Behind Act requires schools to continuously improve the scores of all students on high-stakes multiple-choice tests. This has created challenges for science educators, who also want their students to participate in and learn about more authentic aspects of science and inquiry that are impossible to measure with such tests. In order to help address these challenges, the research and evaluation staff is collaborating on a two-year study with researchers from the University of Georgia's Learning and Performance Support Laboratory. They are working with Georgia science teachers to conduct innovative design-based evaluations of three Classroom of the Future™ multimedia science curricula. As part of the evaluation, researchers are developing unique classroom assessments and formative feedback materials. The researchers expect to find that the students who use the materials will show statistically higher scores on the two most relevant science subtests on Georgia's high-stakes criterion-referenced test.



Completed PROJECTS: 2003

Cuyahoga Valley Environmental Education Center (CVEEC). We worked with the CVEEC and the Summit Education Initiative to develop nine online curriculum supplements related to environmental issues within Summit County, OH. All of the models used problem-based activities requiring students to formulate problem statements, collect and analyze data, and then prepare and present their findings. Funding source: GAR Foundation.

Foundations of Freedom™. This DVD curriculum supplement about constitutional history was developed for high school history, civics, and social studies classes. It demonstrates the power of a case study approach to history education. Students immerse themselves in challenge questions related to themes in the history of the U.S. Constitution. Students conduct authentic historical research to draw conclusions about how important constitutional themes have evolved in the course of U.S. history. All necessary research materials for student investigations are contained within an extensive electronic archive. Funding: U.S. Department of Education. www.cet.edu/constitution

Jesuit Distance Education Network (JesuitNET). JesuitNET designed and implemented a series of Competency Assessment Distance Education (CADE) workshops to help instructors rethink online course design and delivery through a cognitive apprenticeship process and understanding by design principles. The evaluation of the CADE workshops was designed around three areas of inquiry: demographic profile of workshop participants, quality of participation in CADE workshops, and quality of portfolio materials developed by workshop participants. Funding source: JesuitNET through a grant from the U.S. Department of Education.

Lewis and Clark Rediscovery Project: Lifelong Learning Online. In recognition of the 200th anniversary of the Lewis and Clark exploration, the University of Idaho teamed with the center and the University of Montana-Missoula to build a learning environment that offers an introspective look at our country. Maps, images, geographic data, and NASA visualizations are housed in a database that interacts with the University of Idaho's learning environment interface. Using multimedia from historians, American Indians, scientists, and citizens connected to the Lewis and Clark saga, the project piques students' curiosity and looks at the growth of the United States, from the Louisiana Purchase through the 200 years of change that followed. The program will become a model for online education for K-12 and college courses. Funding source: The University of Idaho through a grant from NASA.

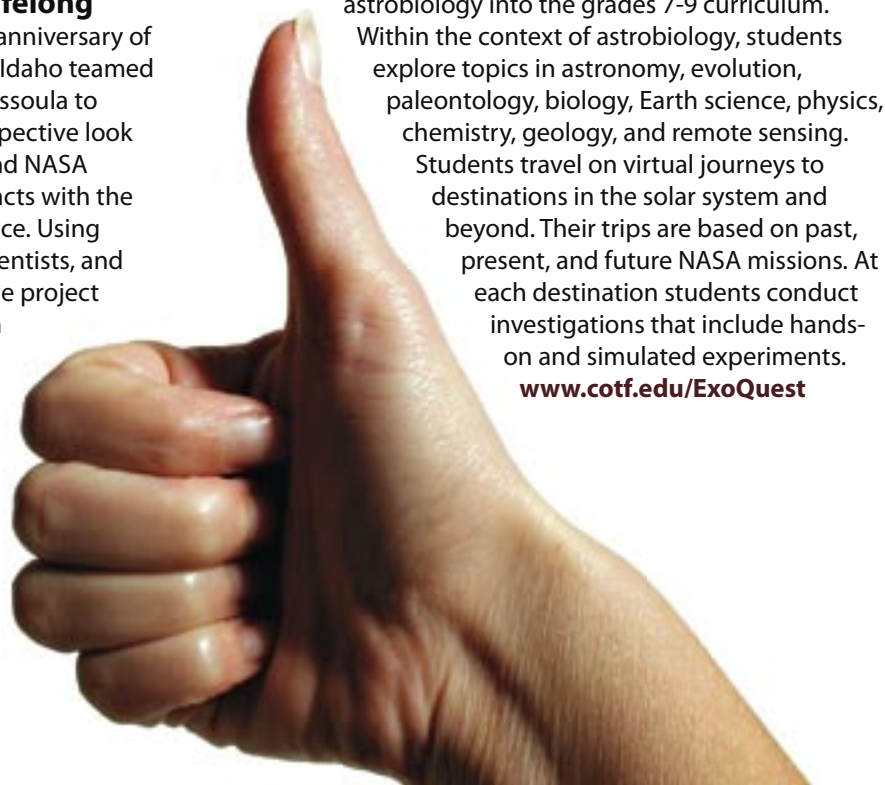
Completed PROJECTS: 2000-2002

Astronomy Village: Investigating the Solar System®. This multimedia program supplements existing science curricula in elementary, middle, or high school classrooms. Two core research areas, encompassing seven focused investigations, form the basis for student explorations. Each investigation encourages students to participate in scientific inquiry individually or as members of a cooperative learning group. www.cet.edu/av2

Astronomy Village: Investigating the Universe®. Astronomy Village provides 9th- and 10th-grade science classrooms with 10 complete investigations of important questions in stellar astronomy. It simulates living and working at a mountaintop observatory (the village) as the primary interface through which students investigate contemporary problems in astronomy. Students have access to an image-processing program, a document reader, an image browser, the Internet, simulation programs, digitized video clips, Hubble Space Telescope images, interviews with astronomers, computer animations, and graphics. www.cotf.edu/av1

BioBLAST®. The BioBLAST (Better Learning through Adventure, Simulation, and Telecommunications) CD is a curriculum supplement for high school biology classes and is based on NASA's advanced life support research. The curriculum offers students both traditional and computer-based research tools to study the interdependent components of a bioregenerative life-support system for long-term space habitation. www.cotf.edu/BioBLAST

ExoQuest®. Whether or not extraterrestrial life exists is a question of immense popular interest and a scientific issue of profound importance. ExoQuest uses this question as a framework for integrating current research in astrobiology into the grades 7-9 curriculum. Within the context of astrobiology, students explore topics in astronomy, evolution, paleontology, biology, Earth science, physics, chemistry, geology, and remote sensing. Students travel on virtual journeys to destinations in the solar system and beyond. Their trips are based on past, present, and future NASA missions. At each destination students conduct investigations that include hands-on and simulated experiments. www.cotf.edu/ExoQuest



Partners/Collaborators

Drs. Kim Good and Kimberly Hambrick, Appalachian Educational Laboratory

Dr. Neil Schwartz, California State University-Chico

Dr. Sylvia P. Heubach, California State University-Los Angeles

Dr. Jerry Simila, California State University-Northridge

Janet Heinke, Carnegie Science Center

Dr. Jo Murray, College of St. Scholastica

Dr. Jim Botti, consultant

Dr. Linda Hayden and William Porter, Elizabeth City State University

Derrick Pitts, Franklin Institute

Dr. Janet Kolodner, Georgia Tech

Dr. Dianne Robinson, Hampton University

Dr. George Carruthers, Howard University

Herbert M. Atherton, independent historian

Dr. Cesar Nunez and Mat. Carlos Astengo, Instituto Tecnológico y de Estudios Superiores de Monterrey

Theresa Scherwin and Nancy Colleton, Institute for Global Environmental Studies

Dr. Dimiter Dimitrov, Kent State University

Willie R. Mackey, Lincoln and Cheyney Universities

Mr. Glenn Beer, Louisiana Tech University

Flavio Mendez, Maryland Science Center

Dr. Michael Witiw, meteorologist

Dr. Denis Jarvinen, MetriTech Inc.

Dr. Ed Wolfe, Michigan State University

Dr. Joan Whitworth, Morehead State University

Dr. Steven Croft, National Optical Astronomy Observatory

Dr. H. Prentice Baptiste, New Mexico State University

Drs. Danny Edelson and Brian Reiser, Northwestern University

Dr. Gary Belovsky, Notre Dame University

Geoffrey Haines-Stiles, Passport to Knowledge

Ruth Ruud, Pennsylvania State Science Teachers Association

Kip Bollinger, science adviser, Pennsylvania Department of Education

Drs. Barbara Grabowsky and Hoi Suen, Penn State University

Dr. Bonnie Prince, Prince and Associates Ltd.

Dr. Mark Turski, Plymouth State University

Drs. Chris Anderson and Diana Erchick, Ohio State University

Raymond Smock, Robert C. Byrd Center for Legislative Studies

Dr. Pasula Messina, San Jose State University

Dr. Laura D'Amico, Simon Fraser University

Dr. Julie Lutz, Space Science Network Northwest

Drs. Geneva Haertel, Angela Haydel, and Edys Quellmalz, SRI

Katy Goodwin, Summit Education Initiative

Dr. Hilarie Davis, Technology for Learning Consortium

Dr. David Allard, Texas A&M University-Texarkana

Dr. Dan Hickey, University of Georgia

Drs. Michael O'Dell and Robert Kearney, University of Idaho

Dr. Okhee Lee, University of Miami

Drs. Ron Marx and Joe Krajcik, University of Michigan

Dr. Russanne Low, University of Minnesota

Dr. David Jonassen, University of Missouri

Dr. Wesley Snyder, University of Montana

Dr. Neal Grandgenett, University of Nebraska-Omaha

Drs. John Pegg and Deb Panizzon, University of New England (Australia)

Dr. Fred Scatena, University of Pennsylvania

Dr. Jess Zimmerman, University of Puerto Rico

Dr. Lionel Crews, University of Tennessee-Martin

Dr. Kevin Czajkowski, University of Toledo

Dr. James Ronda, University of Tulsa

Dr. David Caulum, University of Wisconsin-Madison

Dr. Fred Siewers and Rico Tyler, Western Kentucky University

Drs. Ben Stout, John Cox, and Joseph Laker, Wheeling Jesuit University

Dr. Bill Slattery, Wright State University

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University of Idaho

U.S. Department of Education

West Virginia Higher Education Policy Commission

West Virginia Humanities Council

