

QUARTERLY

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY

SPRING 2000



Students join
NASA for
research
flight!

- Story page 6

A PUBLICATION OF SDSM&T

Perspectives



Dear Friends,

Simply the best! These three words describe well what the South Dakota School of Mines and Technology has become over the last century. Computer technology and computer programs have been major contributors toward setting us apart from other universities.

SDSM&T now offers preparation for computer careers in several areas. The Computer Science curriculum is the only program in South Dakota that is accredited by the Computer Science Commission of the Computer Sciences Accreditation Board. The Computer Engineering curriculum is the only program in the state accredited by the Accreditation Board for Engineering and Technology. We also offer a wide variety of courses in computer and information technology to prepare graduates with the latest developments in distributed networks and system software.

During the last year, placement rates for Tech graduates in all engineering and science programs have been more than 90% within six months of graduation. Starting salaries have averaged more than \$41,000 for our graduates. However, Computer Science and Computer Engineering graduates have fared even better. Nearly 100% of these graduates had job offers in hand before graduation with average starting salaries that topped \$45,000. Starting salary offers for May graduates exceed \$47,000. These graduates have offers from companies like Microsoft and Hewlett Packard, as well as from many local companies including Martin and Associates, SCI, RapidNet, and Comuniq among others. We are especially pleased to see that the economy has greatly improved in South Dakota and salaries have increased by more than 63% in the last three years for computer science and computer engineering graduates. This has occurred as a direct result of the growth of the technology infrastructure in South Dakota and the new technology based career opportunities it presents for our graduates.

Today, students do not have to wait until they set foot on campus to get a jump-start in accessing our computer technologies. They have the opportunity to utilize the advanced computer technology we have available via the Internet. An interactive intranet website has been designed for the entering class of 2000. Our incoming students have the unique opportunity to communicate with other new students, identify other individuals with a similar major or interest, interact with faculty and staff, and receive timely updates on new programs, news and other important information. This is a great advantage for our incoming students.

Where else can students have access to the latest and greatest in technology; interact with internationally recognized faculty; be a part of traditions of excellence that span more than a century; enjoy the beauty and recreational resources of the Black Hills; expect to earn in excess of \$40,000 upon graduation; and participate in countless academic and extracurricular activities for less than \$8,000 per year, for SD residents?

SDSM&T is indeed simply the best option for engineering, science, and computer career preparation. To learn more about our programs or the Intranet for the entering class of 2000 contact the Office of Academic and Enrollment Services at 605 394-2400.

Sincerely,

Richard J. Gowen, President

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY QUARTERLY

Spring 2000

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SDSM&T Quarterly is published by the
Office of University & Public Relations.

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CAMPUS Profile

The South Dakota School of Mines and Technology, founded in 1885, has been a national leader in preparing world-class engineers and scientists. Our graduates design, construct, and operate modern technology to meet complex challenges such as global warming, health care delivery, energy resource development, mineral extraction and processing, environment quality, futuristic transportation, and national defense. Our alumni are held in the highest regard by their fellow leaders in industry, consulting, government, health and education.

Tech has diversified to meet the needs of engineering and science throughout the world. South Dakota Tech's intellectual environment was shaped a century ago by the ingenuity and rugged individualism of pioneers in science and technology. Tech's present day pioneers provide inspiration and remain on the cutting edge in the fields of engineering and the sciences.

ACADEMIC PROGRAM: SDSM&T is a state-assisted university providing graduate and undergraduate degrees in science, engineering, and interdisciplinary studies.

BACHELOR OF SCIENCE DEGREES

Chemical Engineering	Geology
Chemistry	Industrial Engineering
Civil Engineering	Interdisciplinary Science
Computer Engineering	Mathematics
Computer Science	Mechanical Engineering
Electrical Engineering	Metallurgical Engineering
Environmental Engineering	Mining Engineering
Geological Engineering	Physics

MASTER OF SCIENCE DEGREES

Atmospheric Sciences	Materials Engineering and Sciences
Chemical Engineering	Sciences
Civil Engineering	Mechanical Engineering
Computer Science	Paleontology
Electrical Engineering	Technology Management
Geology and Geological Engineering	

DOCTORATE OF PHILOSOPHY DEGREES

Atmospheric, Environmental and Water Resources
Geology and Geological Engineering
Materials Engineering and Sciences

ENROLLMENT: The University has a diverse enrollment of approximately 2,200 students from nearly 30 states and 20 countries. Our 13 departments offer 30 degree programs in engineering and science disciplines at the baccalaureate, masters, and doctoral levels. Students enter the university with the highest ACT composite in the state and more than half graduating within the top 25 % of their high school.

COSTS AND FEES: Annual undergraduate costs for tuition, fees, room and board total less than \$8,000 per year for residents of South Dakota, Alaska, Colorado, Hawaii, Idaho, Minnesota, Montana, Nevada, New Mexico, North Dakota, Oregon, Utah, and Wyoming. Annual total costs for all other undergraduates is less than \$11,000 per year.

RESEARCH: High quality research is conducted in departments and in our research institutes.

FACULTY: There are approximately 100 faculty with degrees from more than 150 institutions, eighty five percent of which have earned doctoral degrees.

Dow Corning puts SD Tech Chemical Engineering Program

To keep up with the fast pace of changing industrial technology, and to better prepare students for success navigating in the industrial environment, the Dow Corning Foundation has awarded a \$200,000 grant to the South Dakota School of Mines & Technology to establish the Dow Corning Foundation Enhanced **M.A.P.S.** (Materials, Automation, Processing, and Simulation) Laboratory for the Chemical Engineering Program.

The grant represents the cornerstone funding for an innovative and practical approach to Chemical Engineering experiences at SD Tech focused on design, processing, and testing of materials. Through laboratory experiences that build in complexity, students will integrate proficiencies in **M**aterials handling, pilot plant **A**utomation, **P**rocess control, and **S**imulation software, thus mapping a course in experiences and knowledge that can be readily applied as future industrial employees.

Steered by a partnership that spans 45 years, SD Tech and the Dow Corning Foundation are enabling students with the skills, knowledge, and hands-on experience to prepare them to 'hit the ground running' in industries across the country. The **M.A.P.S.** grant will give students hands-on, open-ended laboratory experiences integrated into the chemical engineering curriculum that parallels work being done in industry today. In addition, these experiences extend beyond the laboratory.

"It is not just the lab that is going to be beneficial," said Doug Aldrich (BS ChE '62, MS ChE '68), Dow Corning Global Manager of Laboratory Facilities, Science and Technology. "It is really tying together all the course work, labs, and independent research. Getting the professors and students really collaborating on this is what is going to make this **M.A.P.S.** lab an absolute step change in how schools prepare their engineers for the future. I am just glad

that SD Tech is one of these making step changes. This is looking forward to a very bright future for both the School of Mines and Dow Corning."

Graduates of SDSM&T have been recruited by Dow Corning for more than four decades, and Dow Corning has been the top employer of Tech's Chemical Engineering graduates for the past ten years. This longstanding partnership benefits both through active co-op participation and recruiting, previous projects with a materials focus, and strong employee retention and performance. Doug Aldrich has been recruiting graduates for Dow Corning from South Dakota Tech for 30 years. He began conducting on-campus interviews in 1969 and to date has conducted 1,039 interviews, and hired 81 graduates for full-time jobs.

"I think Dow Corning is one of the top materials company that has a notch school in South Dakota and will continue to flourish in partnership."



Dr. Gowen and James Chittick, Corporate Vice President of Supply Chains for Dow Corning, commemorate the partnership between SDSM&T and Dow Corning. Pictured L to R: Dr. Steven McDowell, Chair and Associate Professor, Department of Chemistry and Chemical Engineering; Dr. Karen Whitehead, Vice President for Academic Affairs; Dr. Richard Gowen, Dr. David Dixon, Associate Professor, Department of Chemistry and Chemical Engineering; James Chittick; and Dr. James Munro, Interim Dean and Professor, Department of Chemistry and Chemical Engineering

Tech on the M.A.P.S. - Receives \$200,000 Grant

"When we consistently get people who do well it is a very fertile field to continue to recruit at SD Tech. Then you add the opportunity to invest in scholarships and donations of equipment, and to cap it off with this wonderful \$200,000 grant, we know we will benefit and know lots of other places, including the university,

will benefit as well. Everyone is a winner," said Aldrich. "I think Dow Corning is a premier materials company that wants to invest in a top notch school in South Dakota Tech that has and will continue to flourish as a great partnership."

Jim Chittick (BS ChemE, '63), Corporate Vice President of

Corning is a premier
that wants to invest in a top
Dakota Tech that has
flourish as a great

-Doug Aldrich

Supply Chains for Dow Corning is one of many SDSM&T graduates employed by Dow Corning, and he is "thrilled to see this level of commitment from the Dow Corning Foundation to his alma mater."

In order to continue sending qualified chemical engineering graduates to Dow Corning, the Chemical Engineering program at SD Tech has been gearing towards making fundamental changes and acquiring state-of-the-art equipment for quite some time. In their effort to accomplish this, the program has expanded on the strength of its faculty. Drs. Jan Puszynski and Robb Winter afford a vast knowledge of research expertise in the fields of materials/ceramics and polymers. This is complemented by expertise in polymers and supercritical fluids (Dr. David Dixon), processing and educational research (Drs. Larry Bauer, D. Dixon, J. Puszynski, R. Winter), as well as process control and automation (Dr. James Munro). Unique in the country is the fact that all of the chemical engineering faculty have developed expertise in process simulators and are now all actively using AspenPlus, an industrial state-of-the-art simulator. Combining their research and teaching strengths together into a novel concept for teaching laboratories, the faculty has started development of the new **M.A.P.S.** lab.

The new facility will include a central operations control room for the Chemical Engineering laboratory, and three innovative open-ended, hands-on design laboratory experiments. The key objectives of this project are to integrate classroom theory and process simulator skills to a meaningful laboratory experience; to develop expertise in modern data acquisition and control of pilot-plant scale equipment; and to provide an experience where students can apply and test their design skills in a laboratory setting on state-of-the-art process equipment.

"The addition of the Enhanced **M.A.P.S.** Laboratory to the Chemical Engineering curriculum has benefits that stretch beyond what we can measure," said Dr. David Dixon, Associate Professor of Chemical Engineering. "The future success of SD Tech



graduates at Dow Corning and industries worldwide depends on preparing future employees who can integrate theory and process simulation with innovative design skills and solid hands-on materials processing expertise. And this," he added, "will now be accomplished at this new ChemE lab at South Dakota Tech."

The \$200,000 grant received from the Dow Corning Foundation builds on a 45-year partnership dedicated to providing students at the South Dakota School of Mines & Technology with the best educational opportunities available. The experiences gained through the **Dow Corning Foundation Enhanced M.A.P.S. Laboratory** will provide Tech students with innovative educational experiences leading to enhanced learning and to graduates who are better prepared to solve this century's industrial challenges.



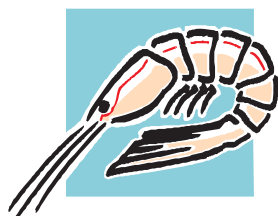
Crab, Lobster & Shrimp

Museum Receives More Than 20,000 Fossils

A significant collection of fossil decapod crustaceans, crabs, lobsters, and shrimp, has been donated to The Museum of Geology at the South Dakota School of Mines & Technology (SDSM&T). The collection, donated by Gale A. Bishop (BS Geol '65, MS Geol '67), consists of more than 22,000 specimens with field and photographic documentation, and a library of books, reprints, manuscripts, and proposals defining the research completed on the collection over that last 30 years.

The collection of fossil decapods, thought to be one of the largest in the world, consists predominantly of fossils collected from the Cretaceous time period of the Western Interior, between 130-65 million years ago, particularly from areas in what is today South Dakota and Montana. Also represented are significant collections from the Cretaceous of the Mississippi Embayment (Northern Mississippi) and Central Texas (Dallas - Ft. Worth Area). Fewer specimens represent world-wide localities and younger sedimentary deposits in Georgia and South Carolina.

The return of the Collections to South Dakota represents a significant contribution to the Museum of Geology, which now becomes a center for both invertebrate and vertebrate paleontologic research. The collection brings these important fossil resources back to their region of origin, keeping a "public trust" with area ranchers and land-owners who entrusted the collection and description of the fossils to Bishop and his colleagues over the last quarter century. The building of this paleontological resource was due to the cooperation of many ranchers in Montana and the Dakotas, and to the support and understanding of land managers with many Federal agencies.



"The public is indebted to Gale Bishop for his years of dedicated documentation of these creatures and for his willingness to return the collection to South Dakota where it will be accessible to all," said Dr. James Martin, Professor, Department of Geology and Geological Engineering, and Curator of Vertebrate Paleontology, Museum of Geology. "This collection represents a standard by which all later decapod workers will be measured."

Bishop's donation to the Museum has already sparked additional paleontological contributions. A research colleague, the

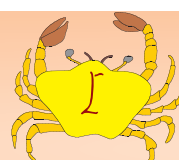
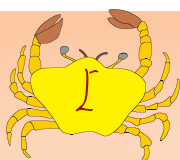
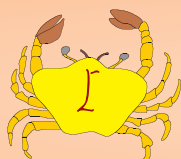
late Dr. Austin B. Williams, U.S. Fish and Wildlife Systematics Laboratory, Smithsonian Institution, and one of the leading specialists on the classification of modern decapods, donated his collection of approximately 9,000 specimens and documentation to the Museum of Geology shortly before his death in 1999. "The 'Austin B. Williams Collection' will be maintained as a separate, complementary collection in his honor," said Bishop, who is now assisting Collections Manager and Preparator Carrie Herbel curate both collections to render them into usable condition for visiting scientists in the "Crab Lab," at the Museum of Geology. The donation, made through the SDSM&T Foundation to the Museum of Geology, will soon be available to scientists from around the world who will visit the School of Mines to study the research materials.

"This donation was the direct result of numerous discussions with Museum Director Dr. Philip Bjork, and Dr. Martin. Both not only helped me in my research over the years, but were instrumental in helping found The GSU Museum at Georgia Southern University where I taught for 29 years," said Bishop. "The camaraderie and positive attitude of these two scientists, Tech students, and members of the Museum of Geology and Department of Geology and Geological Engineering at the South Dakota School of Mines and Technology, stand as a remarkable



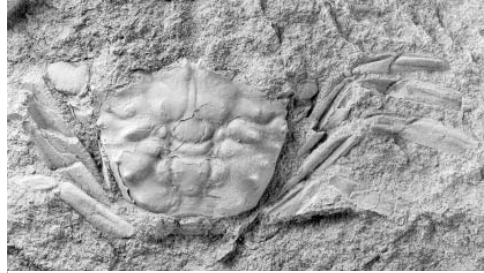
Chance and Cindy Davis' Heart Tail Ranch was the source of many fossil decapod discoveries.

statement of those taking pride in their work in South Dakota, and as recognition of the state's phenomenal paleontological and geological resources."



1 Feast

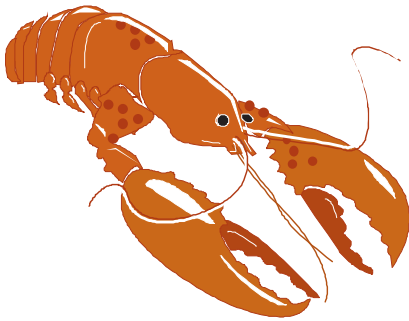
sil Decapods



Story photos courtesy of Dr. Gale Bishop

Longusorhis Cumiculosis - cretaceous crab from the Puget Sound area

Bishop pointed out that much of the research, although done while receiving his Ph.D. at the University of Texas at Austin under supervision of Dr. Keith Preston Young, was done with direct advice and assistance from Tech Geology Professors Emeritus Drs. John Paul Gries, John Mickelson, and former Tech professor Dr. Fred Rich.



Bishop's interest in decapods was sparked in 1963 when he was asked by the late Harold E. Martin, Chief Preparator at the Museum of Geology, if he would drive to Bump-Young Hill on the east valley wall of the Cheyenne River to salvage any fossils from the incipient construction of S.D. Highway 40. That collection, containing numerous small fossil crabs, triggered an interest and passion for understanding the history of the Cretaceous crabs, shrimp, and lobsters of the Western Interior Seaway. Those studies resulted in the description of many new species, defining the preservational characteristics of the decapod faunas of South Dakota, and in the study of modern analogs on the coast of Georgia. The studies resulted in 43 of the 75 papers published by Bishop.

This research track in turn led to Bishop's more recent studies of the distribution of modern Ghost Shrimp on the Georgia coast, the accumulation and distribution of deposits of heavy mineral deposits, and the evolution of Georgia's Barrier Islands. These studies subsequently led to a collaborative science education program with Portal High School Science Department Head, Nancy Brannen Marsh, in designing and implementing "The St. Catherines Island Sea Turtle Conservation Program," now in its ninth year of operation and funded for years nine and ten.

The Sea Turtle Program has resulted in the development of an innovative Natural History Science Education Model that is being implemented through a new web site, "Natural History of the Northern Great Plains and Black Hills." The website will test the Natural History Model by emulation of the sea turtle program and will serve as a teaching and learning base for the northern Great Plains and Black Hills areas.

Bishop has retired from full-time classroom teaching in Georgia to his new home in Spearfish where he is building a consulting company in geology, paleontology, and science education. He continues as Co-Director of The St. Catherines Sea Turtle Conservation Program where he will continue to work during the Loggerhead Sea Turtle nesting season.

To learn more about the fossil decapod collection, visit the Museum of Geology on the SD Tech campus at 501 E. Saint Joseph Street in Rapid City, or call (605) 394-2467. If you are looking for an opportunity to participate in fossil expeditions you won't want to miss the Museum of Geology's Summer Field Dig program. This is your opportunity to participate in scientific excavations of important paleontological sites in the Black Hills region and Pacific Northwest. Visit <http://www.bpcnet.org/dinodigs> for a calendar of the upcoming summer field digs.



Paleontological colleagues (L to R) Austin Williams, Dr. Phil Bjork, Dr. James Martin, and Dr. Gale Bishop at the Jurassic Site near Sundance, Wyoming.

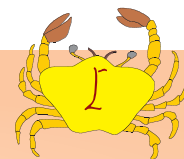
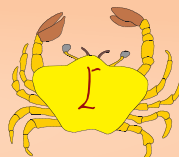
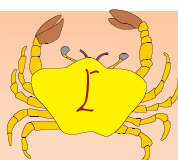


photo courtesy of NASA

"Wow! Floating humans – incredible feeling!" – Louie Arguello

"That was totally and completely awesome. It was the BEST time I have ever had. It was the most cool feeling in the world; you have all this weight on your body and all of the sudden there is nothing and you are floating towards the ceiling" – Alan Gertonson

"That was totally cool! I am so glad I didn't feel any motion sickness at all! That was very, very cool!" – Victoria Olson

"Pretty awesome! Definitely the most amazing experience I've had thus far. I'm ready to go to space." – Jed Brich



L to R: Dr. and Mrs. Gowen, Tom Durkin, Joe Rothenberg, NASA Deputy Director of Space Flight, Astronaut Bonnie Dunbar, Louie Arguello, Angie Monheim, Victoria Olson, Jed Brich, Lori Glover, Alan Gertonson, Keith Flanagan, John Keefner, and Jed Padilla. Team members not pictured include Chad Griswold, faculty advisor Dr. Chris Jenkins, and Kari Larese.

What an incredible ride! Months of preparation and expectation all came down to four hours onboard NASA's KC-135 aircraft. We all knew what was before us, but I don't think any of us ever thought the time would actually come that we would be able to put the project to the test in zero-gravity, along with five of us!

A team of nine students led by Angie Monheim (MS EE, Rapid City) met three times a week for four months to ensure their project, "Deployment of a Membrane Reflector in Zero-G," was ready for the rigors of zero-gravity. The goal was to determine the behavior and final shape of a membrane in reduced gravity conditions.

When we left for Houston on the morning of Sunday, March 5, little did we know what lay ahead for us. In addition to the zero-gravity flight onboard the "Weightless Wonder," or "Vomit Comet,"

as it is more affectionately called, we were treated to tours of the Neutral Buoyancy Lab, Space Shuttle Mock-Up, and X-38 aircraft – just to name a few. Activities highlighted by talks from Apollo Flight Director Gene Kranz, multiple astronauts, and a VIP visit from Joe Rothenberg, NASA Deputy Director of Space Flight, rounded out the two weeks. We not only participated in a zero-gravity research program, but learned a lot about careers at NASA, astronaut training, and the many co-op opportunities the students were encouraged to apply for.

"The trip to JSC far exceeded my expectations. We got an up-close look at NASA – something that not many are able to do," said Jed Padilla (CSC, Cheyenne, WY). "This was Tech's first time to take part in this program and it proved to be very worthwhile and invaluable for those of us that came down to Houston. If I

have any say, Tech will have a repeat appearance next March and every year after that."

Once we arrived at JSC, we were assigned our two flight days for the following week, March 15 and 16, 2000. March 15 is a day that I will never forget. Our early morning pre-flight briefing with NASA Test Directors, and our flight surgeon for the day, Dr. Jim Logan, tried to prepare us, a group of 16 students and four journalists, for what we were about to experience. He explained why such a high number of first-time fliers become a 'kill,' or get sick during the KC-135 flight. Three organs in the human body tell you which way is up and down and during the first few parabolas they are all sending different signals, and as one who flew and defeated the "Vomit Comet" this is absolutely true. Those first parabolas where I let myself float, I honestly could

TECH STUDENT TEAM GOES WEIGHTLESS WITH NASA

Joins NASA for Research Flight

Quarterly 6 SDSM&T

not tell you which way was up or down. Eventually my senses figured out what was happening and acclimated to the environment.

The KC-135 simulates zero-gravity by flying a series of parabolas at an altitude between 26,000 and 39,000 feet. The plane ascends and dives 8,000 feet each time, and as we came over the top we experienced between eight and 12 seconds of zero-g. In the end, we flew a total of 32 parabolas, 30 of which simulated zero-g, while the other two simulated lunar and martian gravity fields.

"If you were to look at the plane from the side you would literally see it climbing straight up and then taking a nose dive to the ground," said Victoria Olson (ChemE, Rapid City). "The strange thing is that you have no sensation the plane is flying in such a way. Gravity is pulling us to the floor of the airplane. We felt zero-gravity as it came over the top, and two-g's during the climb and dive portion. Luckily the plane had no windows so we could not see what we were actually doing – otherwise our flight might have had more kills than the 10 out of 20 we had."

SD Tech's experiment fared exceptionally well on the zero-g flight. As

Keith Flanagan (ChemE, Florence) stated, "It worked out far better than I anticipated. I was surprised that we were so successful with the experiment!" The flight teams encountered no problems with the project, and now face the arduous task of analyzing the data collected.

"The data will tell us how much deformation we got in the membrane," said John Keefner (GeoE, Black Hawk). "We should see more distortion under one-g and two-g's, and when rotating at 180 RPMs we should see signs of it bending outwards. We built it with some deformation so that with gravity gone the membrane will shape into place."

Once membranes can be constructed so that there is no deformation in zero gravity, they can be utilized for many purposes, including communications use as a reflector to bounce signals to different satellites; solar sails for transportation; and to light up places on the earth.

"The reduced gravity program began four years ago, and with each campaign it is evident the proposals contain more and more thought on behalf of the students and reflect more professional projects," said Donn Sickorez, JSC education coordinator for the program. "The

students come here to Ellington Field and participate in an atmosphere that promotes sharing. Students come here with a lot of book knowledge, while the experts at JSC have up to 30 years of experience in various aspects of space flight. It is great because students get to see different positions, and find out about jobs that often times you are not aware of."

SDSM&T's participation in the program was supported through the South Dakota Space Grant Consortium (SDSGC). Tom Durkin, Deputy Director SDSGC, was instrumental in the success of the program and helped ensure a proposal submitted in the fall of 1999 would carry nine students to Houston, TX where they would spend an unforgettable two weeks learning, sharing, and experiencing things that not many have an opportunity to do.

The first team from SDSM&T to participate in the reduced gravity program included: Louie Arguello (ChemE, Rapid City), Jed Brich (CEE, Oglalla, NE), Alan Gertonson (ChemE, Philip), Victoria Olson, Keith Flanagan, Lori Glover (ChemE, Sturgis), John Keefner, Jed Padilla, Chad Griswold (Met, Sturgis), and team coordinator Angie Monheim.



Victoria Olson gives the thumbs up as she prepares to enter the altitude chamber.

photo courtesy of the Raver



Keith Flanagan works on SD Tech's project: "Deployment of a Membrane Reflector in Zero-Gravity."

photo courtesy of NASA



Jed Brich experiences weightlessness onboard the KC-135.

Story author, Kari Larese, Public Information Manager (pictured left on the cover with Victoria Olson on the right), served as team journalist for the KC-135 project.

EARTH SCIENCES PROJECT CONNECTS

CLASSROOMS & CULTURES

FROM THE ROCKIES TO THE APPALACHIANS

As humans continue to subject the Earth's dynamic and interdependent systems to greater levels of stress and demand, it is paramount that educators help young children appreciate the significance and delicate nature of our natural environment. From birth through one's life every individual is a part of the greater system and every action affects the natural environment in which we live. A decision to drive a car or walk, build a house, plant a garden—every action may cause an incremental change in the environment. With the increasing strain put on Earth's systems, educators need to teach children about the interconnectedness of the atmosphere, oceans, and land systems, and educate them on their place within the whole system.

"Earth Systems Connections: An Integrated K-4 Science, Mathematics, and Technology Curriculum" is the title of a collaborative research project taken on by three individuals who acknowledge the necessity to teach children about the interconnectedness of the environment. Dr. Lee Vierling, Assistant Professor, Institute of Atmospheric Sciences at the South Dakota School of Mines & Technology, Dr. Jeffrey Frykholm, Assistant Professor, School of Education at the University of Colorado, and Dr. George Glasson, Associate Professor, Department of Teaching and Learning at Virginia Tech University, are developing a K-4 Earth system's curriculum to provide integrated learning opportunities for children at six elementary schools across the country.

The goal of the pilot program is to help students recognize the interconnected nature of the Earth's systems; appreciate the technological tools that scientists use to conduct Earth system science; recognize the extent to which mathematics, science, and technology are not only connected to each other but also can serve as tools to help understand the natural phenomena we experience; and to cultivate a spirit of curiosity and confidence in themselves as emerging thinkers and scientists who will be responsible for understanding and caring for the Earth in the decades to come.

"By creating a well connected, nurturing curriculum that includes different types of learning, there will be more students who have a better appreciation of math, science, and technology," said Vierling. "We hope to develop activities for students to better understand the relationship between the different aspects of the earth system, such as vegetation, rocks, the oceans, and the atmosphere, and that changes occurring to one part of the system may have far-reaching impacts on other parts. It is equally important to show how humans play a role in that cycle," he added.

An example of how the researchers can show how each classroom or student is a part of the greater system is through

remote sensing and internet capabilities. Using satellite imagery, students can be shown a series of pictures starting with an image of their school. The pictures then progress to show the city block where the school is located, the neighborhood it is in, the city, and then state where the school is located. After each progression the students are able to come back to their point of origin in the first picture of their school. By showing the progression of pictures from a fixed point where the students are working, to the larger image of the state, students can begin to understand their place in nature. By utilizing existing, data, technologies, and resources, students will be provided with more than 50 activities to teach them about their place in nature and of the relationships among the various Earth systems.

One of the guiding principles of the project is the integration of science and mathematics. "For a long time, the common notion has been that math is a collection of facts and procedures to be memorized for use at a later time," said Frykholm. "In this project, we are trying to promote a much broader understanding of the interdisciplinary relationship between mathematics and science. What we hope to create are meaningful contexts in which are imbedded significant

mathematical concepts. As children engage in these rich contexts, they *re-create* the significant mathematics that they need to further understand and pursue them. When children create mathematical understanding for themselves in such a way, and when that understanding is anchored

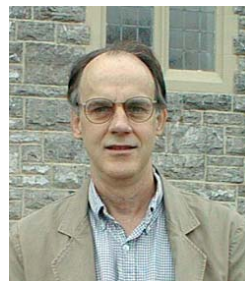
photos courtesy of Dr. Jeffrey Frykholm, Dr. Lee Vierling, & Dr. George Glasson



Dr. Jeffrey Frykholm



Dr. Lee Vierling



Dr. George Glasson

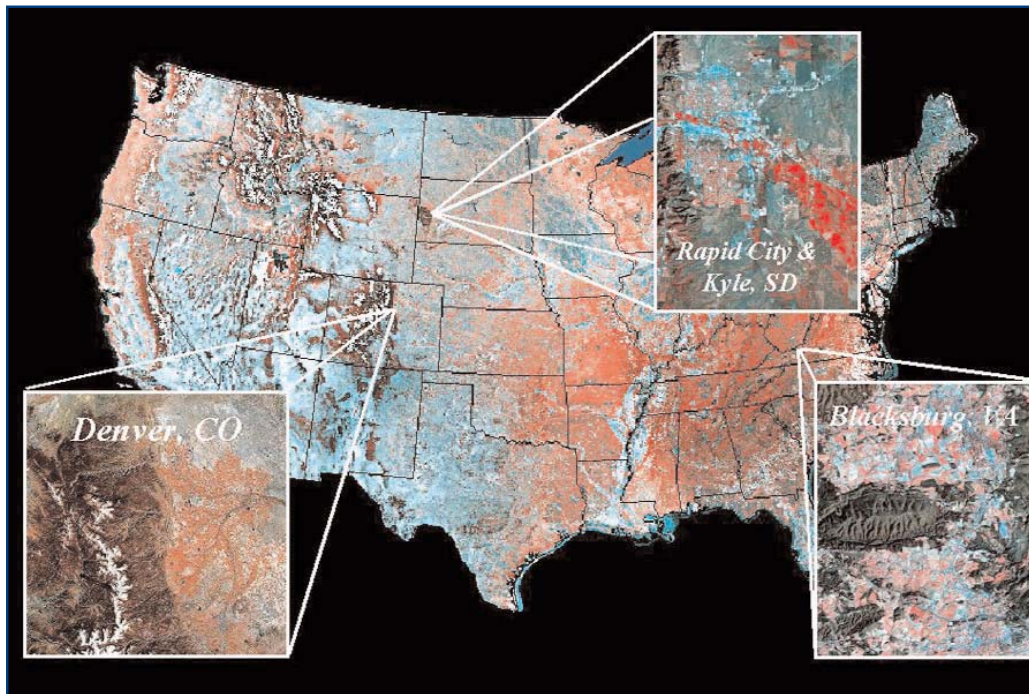
in a culturally relevant context, they are not likely to forget.”

In addition to mathematics and science, technology is the third guiding principle of the project. Technology will allow students at schools in Rapid City, Denver, and Virginia to see the world from different physical and cultural perspectives than they are accustomed to in their own immediate environment. The six pilot schools include students living in inner-city Denver, the Appalachian Mountains, Rapid City, a rural, agricultural community on the

“Ecology has no boundaries and to develop a curriculum where students share data, findings, and activities that we develop in this project across various states enriches their understanding of other areas and other cultures,” said Glasson. “By selecting to study the land habitat or flowers of the different regions, we can use the internet to develop shared lessons. Students in Virginia could take a digital picture of a flower, label the parts, and then send it to students in South Dakota for those kids to learn about some of the ecology found in

in Kyle, Margaret Beeks Elementary School and Price’s Fork Elementary School in Montgomery County, Virginia, Overland Trail Elementary School in Brighton, Colorado, and an elementary school in the Five Points region of inner city Denver. All three researchers hope that the short-term impact this project will have on the classrooms is to energize the curriculum updating the content knowledge and teaching strategies of teachers, and to create excitement in the students about mathematics, science, and technology.

The long term impact the trio hopes to see is the development of a national curriculum which can be accessible by all teachers and students across the country that develops a better global understanding of ecological issues, and of the science of Earth’s System. One of their goals in the onset was to develop a curriculum that would be broadly applicable. A likely outcome of the three-year project will be for NASA to adapt it into their CORE (Central Operation of Resources for Educators) program, which distributes NASA-related curricular materials to teachers across the country.




Colorado plains, and a tribal school on the Pine Ridge Indian Reservation. A quick glance at this list reveals at least four different cultures and living environments that will be brought together through this project. These different groups of students also have probably not traveled far from their homes or experienced other physical and cultural environments. This is where technology will lend a hand in making connections. The internet will allow for shared learning opportunities among all the students and will break down the boundaries separating their neighborhoods and perspectives. Children’s experiences in the inner-city Denver area, experiences of children in the rural schools, as well as Lakota and other tribal creation stories will be brought together in developing the curriculum.

the Appalachian region. And conversely students in Denver and South Dakota could share their habitats with those in Virginia via the internet. There will be no boundaries.”

An important component of the program is to develop modules around real world, scientific, and cultural contexts that resonate with all learners. The success is dependent upon the development of the curriculum with heavy input from teachers, administrators, children, and leaders in the various communities. Students need to see themselves as part of and an active participant in their surroundings, while acknowledging their role in the larger system.

The six elementary schools selected as pilot schools include Wilson Elementary School in Rapid City, Little Wound School

The development of an integrated K-4 science, math, and technology curriculum is integral to cultivating a spirit of curiosity and confidence within students as emerging thinkers and scientists who will be responsible for understanding and caring for the Earth in decades to come. Perhaps the levels of stress and demand to which the environment is subjected by way of human activities may become more sustainable in the future if we begin to educate young children about the connections that exist within the earth’s system. “Earth Systems Connections: An Integrated K-4 Science, Mathematics, and Technology Curriculum” is being designed by a group of conscientious researchers who acknowledge opportunities and challenges, and are going to do something about it. 

Director Charts New Path for SKILL

Rapid City has the largest Native American population of any community in the state and the highest per capita Indian population of any city over 30,000 in the United States. According to census figures from 1990, the Sioux tribe is the third largest in the United States with a population of 107,321. For more than 100 years the South Dakota School of Mines & Technology has been successfully preparing students for careers in science and engineering and in 1989 began addressing the educational needs of the Native American population in the region.

"At the K-6 grade level we would like to re-introduce what former SKILL staff were doing at the target schools we have identified," said Bolman. "They would demonstrate a chemistry or physics experiment to evoke interest in the subjects and then visit with students about SKILL, but highlight the importance of math and science."

Students in elementary school will be taught the importance of learning science and math while discovering the many career choices the fields can offer. In turn, SKILL instructors are assisting to develop and refine a vision for the students to move into junior high, high school, and college courses.

Other ways Bolman, Phelps, and Haas want to extend the program into the K-6 grade levels are to develop a one or two day Spring/Fall field trip experience, and to utilize high school students already involved in the program. A short Spring/Fall field trip to the SD Tech campus could utilize the university faculty to develop programs and excite interest in the science and engineering fields. The trip would be modeled after National Engineers Week K-12 grade activities held each March.

"We would like to incorporate a new dimension to the program

and have high school students enrolled in the SKILL program assist with recruiting and mentoring younger students," said Bolman. "If K-8 graders are going to participate in a science fair, we could have the high school students serve as mentors to help generate ideas and prepare them for the fair itself. This in turn would build leadership skills in the older students," she added.

Additionally, junior and high school students would be incorporated into the SKILL program under a new action plan. This would include balancing curricular activities with leadership or life skills, and developing a science and math curriculum that is equally balanced at all the target schools, including those on the Cheyenne River, Pine Ridge, Lower Brule, and Crow Creek Reservations. Initial findings indicate the course offerings in math and science are not consistent among all grade levels. To combat this problem modules will be developed from the existing SKILL curriculum that will be shared with all schools during the regular academic year.

Other aspects that will be incorporated into the future programming offered through SKILL are improved follow-up and tracking of students, developing and implementing a more



photo by Kari Lareve

Participants in SKILL's Four-Week Residential Program pose by the SDSM&T Arch to commemorate their participation in the summer program

Scientific Knowledge for Indian Learning and Leadership (SKILL) was initiated by SDSM&T and Oglala Lakota College (OLC) with a mission to "Develop and support academic training emphasizing mathematics, science and engineering to enable minority students (principally American Indians) to enroll in and graduate from post-secondary institutions."

SKILL, and NASA have partnered together to meet this goal by offering a summer residency program to encourage high school students in these areas of study. The goal is to give the participants the skills necessary to succeed in higher education and enhance the student's interest in science, technology, and mathematics. The students have been involved in classes covering subjects from physics, chemistry, and biology to communications, and study skills.

New SKILL Director Dr. Jacquelyn Bolman, Summer Site Coordinator Stacy Phelps (ME '96), and OLC PACE (PreCollege Award for Excellence) Principal Investigator John Haas are going to lead the program into the new century by developing the existing one-month summer program into a more comprehensive 12-month K-12 curriculum.

Path American Indian Youth

comprehensive Lakota cultural component through all program areas, integrating field work into the classroom curriculum, and an enhanced math program.

Statistics based upon data collected from 1992-1997 indicated a wide gap between ACT scores for students living on the reservations versus those that were not, demonstrating the need for improved science and math education. Additional data reflected the success of graduates of the NASA program – 100% placement of students went on to higher education, and currently at SDSM&T there are a number of SKILL students. To continue to document the success of the program and to encourage student participation would only benefit the program. Another way to improve learning and participation is to integrate cultural lessons and themes. “Doing so would empower students through their involvement or knowledge in their cultural heritage, and would create an environment of shared learning between teacher and student,” said Bolman.

OLC has continued to bring in Lakota instructors to the summer program each year, but the Lakota Studies component does not resonate throughout the curriculum as it could. The goal is to have an on-site cultural instructor who would call the students together each morning by the sound of a drum. By gathering each morning around the tepee the students would be led by a Lakota instructor and invited to share stories, personal thoughts, arts, etc.

“The lure each morning of a drum would bring the students together and orient them to the purpose of the new day,” said Bolman. “By inviting a few students each day to share with the group we would be building leadership skills and allowing them to think expansively/circularly, experiencing more creative freedom and less structure than the traditional classroom. The parameters of the morning gathering provides them the freedom to be comfortable speaking about what they like, and in turn instill confidence and leadership skills.”

The final two aspects are new strategies of learning and are paramount to the future success of students that enroll in the SKILL programs. Traditionally lessons have been delivered in 4-hour-long classroom periods providing the students with a disillusion of book knowledge. A new method would integrate fieldwork into the curriculum.

For example, if you were learning about geology the students would spend an hour or two in the classroom and then go out in the field the remainder of the time to actually practice what they are learning. The curriculum would be updated so that in chemistry, for example, the students can use what they learn inside and relate it to what is immediately off

their doorstep. The integration allows for a new way of learning and shows the students immediate applications. Of equal importance to field work, is mathematics.

Mathematics skills are paramount to the success in the science and engineering fields. In the SKILL program this will be addressed through computers and assisted learning capabilities. The hopes are to connect students via video phone through their computers. With computers available at each of the target schools, students can begin communication via the internet and utilize it for research and homework assistance.

The South Dakota School of Mines & Technology and Oglala Lakota College began something in 1989 which has led and will lead to great opportunities and advancements for many American Indian students who will participate in its programs. With a new director in place and three individuals at its helm who are proactively looking to the future, SKILL is going to make a new mark in the lives of many students. Through an expanded 12-month program that includes K-12 grade levels, to an improved mathematics curriculum, students are going to reap the benefits for the future.

If you would like to learn more about the SKILL program or find out how you can become involved, contact Dr. Bolman at (605) 394-1828, or via email at jacquelyn.bolman@sdsmt.edu.



photo by Kari Larsen

Theresa Heinbaugh, (left) Secretary, SKILL, and Dr. Jacquelyn Bolman, (right) Director, SKILL, pose for a quick picture.



Photo by Kari Lares

Terra Stroup (IENG, Fort Pierre), a member of the Tech Mini-Baja team, sells raffle tickets at the Rushmore Mall to help raise money for the Human Powered Vehicle, Mini-Indy, and Mini-Baja vehicles.

SDSM&T REACHING OUT

The South Dakota School of Mines and Technology has a firm belief in partnering their faculty, staff, and students with communities, businesses, and K-12 educational organizations throughout the region.

Photo by Kari Lares

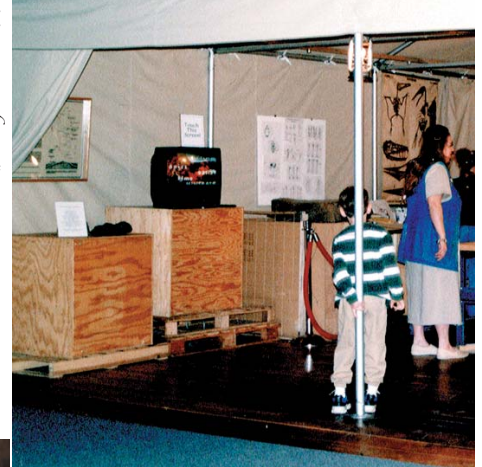


Photo by Kari Lares



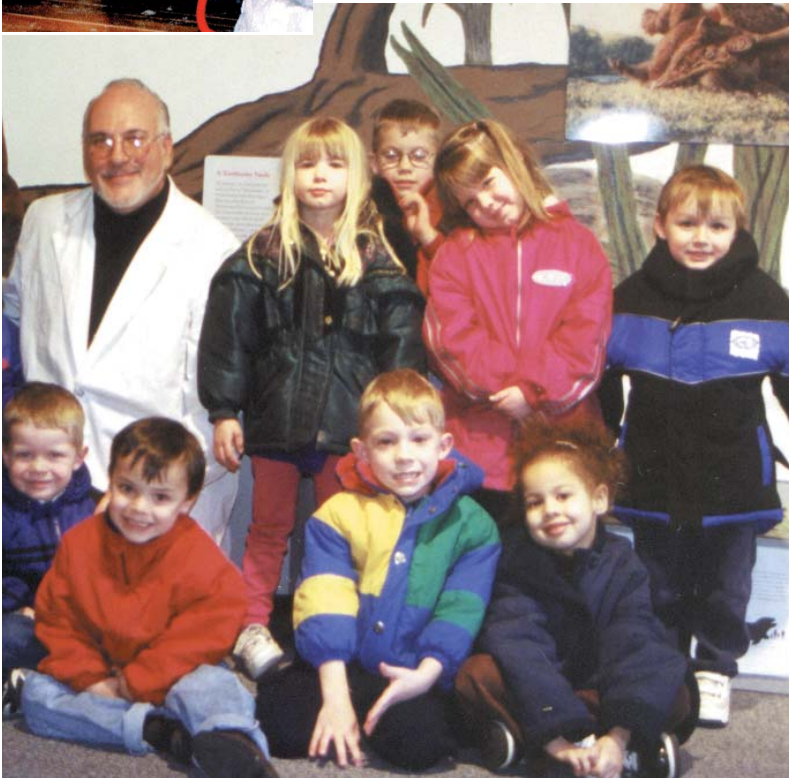
John Lofberg, Administrative Assistant, Office of Academic Affairs, takes the plunge for SD Tech during Rapid City's annual Polar Plunge at Memorial Pond.

The Madman of Magic, Bob Friedboffer performed at the Children's Science Center. He used magical tricks and illusions to demonstrate the scientific principles behind magic.

Photo by Kari Lares



Volunteers Ruth Anderson (left - IS '98) and Tonia Superchi (right - MS PALE, Rapid City, SD) from the SDSMT&T paleontology club staff an exhibit during The Journey Museum open house.



file photo

Dave Ehlers (EE, Yankton) participated in the Bone Marrow Donor Drive held in the Surbeck ballroom. SDSMT&T hosted the drive in hopes that they might locate a match for bone marrow candidates.

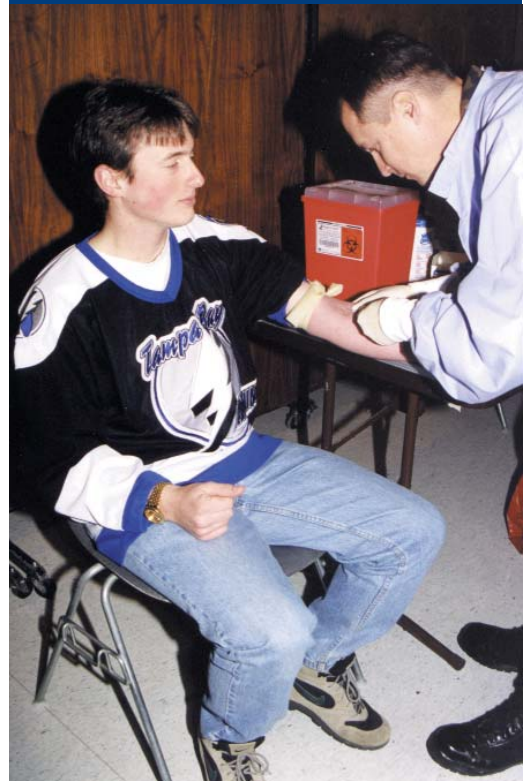


Photo by Kari Larese

SDSMT&T hosted the 36th Annual Concrete Conference. Pictured below L. to R: Basile Rabbat, Portland Cement Association; Mark Luther, Gran Cem Cement; Jim Pierce, Bureau of Reclamation; Henry Russell, Engineering Consultant; M.R. Hansen, Associate Professor, Department of Civil and Environmental Engineering; and Henry McKitterick, Dacotah Cement.



Holly Hall, Assistant Manager, Office of Admissions, and Joe DiBenedetto (MS Pale, Rapid City) staff booths from South Dakota School of Mines & Technology at SD Future Fair 2000 held at Rushmore Plaza Civic Center.



Photo by Kari Larese

Norwegian Computer Firm Expands to Rapid City at Urging of Tech Grads



Good news came to Rapid City and to the students of the South Dakota School of Mines & Technology (SDSM&T) on Monday, March 6, 2000. Governor Bill Janklow announced a new technology development company, Comuniq, has expanded its operations in Rapid City.

A ribbon-cutting ceremony held on March 6 brought out an audience of local government and business officials to celebrate Comuniq's expansion and relocation of their product-development center to facilities off of Deadwood Avenue.

Janklow said this Norwegian-based company is the exact type of company that the state is looking for. "These are high tech, high paying, research and development jobs," he said. "More than 95 percent of the people employed here are engineers with their masters or doctorates." He added, the availability of engineers from the South Dakota Tech and the state's business climate were a big draw for the company. "That's what prompted them to move to Rapid City two years ago and that's what prompted the expansion today," he said.

Jan Bjerke, company president, agrees. "The fact that a great number of Norwegian students attended the South Dakota School of Mines was a big draw for us initially," he said. "Now that we have a core technology team in place, expanding here was the right decision."

Bjerke also said the business climate was a big draw. "South Dakota isn't heavily taxed and that's appealing to any business," he said. "Because of the nature of our business, we knew we could put it anywhere in the world, but we knew that South Dakota offered us access to some of the best people we could find."

South Dakota Tech has a positive, long-standing relationship with the Norwegian engineering community, and has boasted they enroll the largest number of Norwegian engineering students outside of Norway. The qualified graduates coupled with the academic resources of the institution were influential in Comuniq's decision to expand their Rapid City operations.

"At the South Dakota School of Mines & Technology we are committed to preparing the best engineers and scientists in industry today," said Dr. Richard Gowen, President of SDSM&T. "What has been the challenge is in keeping our graduates in the state. I am very pleased that Comuniq is expanding their Rapid City operations and look forward to a very prosperous partnership between the company and our institution. It is evidence that SD Tech graduates truly are the best of their class, and that Rapid City looks forward to future success in the fast-paced technology arena."



Dr. Gowen and members of the Rapid City Chamber of Commerce join Comuniq for a ribbon-cutting ceremony.

Bob DeMersseman, president, Rapid City Area Economic Development Partnership, said the announcement is further evidence that Rapid City is a great place to live and do business. He reiterated Dr. Gowen's sentiment when he stated, "It reinforces our contention that we have a great future in high tech

development."

Comuniq was founded in 1987 in Solo, Norway. The company dug roots in Rapid City in July 1998 with seven software developers. Today the company boasts 21 full-time highly skilled employees, and nine part-time students. The company has operations in Solo and Oslo, Norway, Boston, San Diego, and Paris. This year, in addition to their expansion in Rapid City, operations will open in San Jose, California, United Kingdom, and Germany.

Comuniq develops software for the personal computer based telecommunications market. The company delivers products that are used for building Telephony, Internet Protocol (IP) Telephony and Internet infrastructure. Comuniq has leading products giving access to new, advanced and inexpensive telecom services. A sample of Comuniq's PC based products include voice mail, interactive voice response, automatic call distribution, fax, soft modems, and call centers. The company strives to deliver leading edge products with a significant price/performance advantage.

The South Dakota School of Mines & Technology strives for excellence in engineering and science, and has since its inception been producing top quality graduates in their professions. With the expansion of Comuniq's operations in Rapid City, these graduates will now have job opportunities available to them in the Black Hills. The expansion of one of Norway's largest system integrators into the local

community will only encourage further relocation of high-tech, and engineering firms into an area that is a hot bed for top-notch, knowledgeable graduates.

To read more about Comuniq, visit their website at <http://www.comuniq.com>.



Environmental Engineering

How many times have we heard it? Read it? *A Tradition of Excellence in Engineering and Science Education Since 1885*. It is our motto, that of the South Dakota School of Mines & Technology (SDSM&T). The university's leader, President Dr. Richard Gowen, takes us into a new era where high-tech is the name of the game, and engineering and science disciplines are becoming more focused and interdependent.

At an opening convocation in the Fall 1997 semester, Dr. Henry Mott, Associate Professor of Civil and Environmental Engineering, heard an important message in Dr. Gowen's address. 'It is time to look to new things.' The simple statement was an indicator to Dr. Mott that the university was ready to support a new bachelor's degree program in Environmental Engineering, one that he had first envisioned in 1993. In December 1999, after seven years of discussions, compromise and planning, his vision was realized when the South Dakota Board of Regents (BOR) approved a request for implementation of a Bachelor's Degree in Environmental Engineering at the South Dakota School of Mines & Technology. Effective fall semester 2000 Tech is authorized to award the new degree.

"The development of an environmental engineering degree program at Tech stems from industry demand and student interest," said Dr. Mott. "The program will utilize existing courses and faculty expertise to become one of only a handful of truly interdisciplinary baccalaureate environmental engineering programs in the United States."

The Environmental Engineering program is cooperative among the chemical, civil, geological, metallurgical, and mining engineering programs. The technical foundation of the curriculum includes coursework in mathematics, chemistry, physics, and biology. Additionally, to provide students with an understanding of how pollutants behave in the environment, they will complete classes such as fluid mechanics, thermodynamics, heat and mass transfer, geology, groundwater and surface water hydrology, atmospheric science, and environmental systems analysis. Students will then round out their core coursework with English, technical communications, humanities and social sciences, statistics, engineering economics, and numerical analysis. Each student will also opt for a specialty consisting of five to six required and elective courses in a sequence arranged by one of the five programs and will participate in a two-semester capstone design experience that will involve work with a multidisciplinary team on the solution to an environmental problem.

Environmental engineers serve society at its most fundamental level in caring for the air we breathe, the water we drink, and the soil in which we grow our food. Virtually any action taken by our society has environmental implications, hence, design teams must now include environmental engineers. Moreover, the increased number of environmental regulations



New Degree Program Addresses Need For Global Conscience

placed upon industries has created a demand for trained environmental engineers. Career opportunities with government, industry and private consulting firms exist in abundance for students graduating with degrees in environmental engineering.

Environmental engineers with a chemical engineering focus would find positions in the chemical processing industries, pharmaceuticals, or any industry that prepares products for consumers use. Additionally, these graduates would be useful in remediation of hazardous waste sites, applying their understandings of the systems and methodologies for remediation.

Individuals with the civil engineering specialty typically would work with the infrastructure of a country. They would involve themselves in treatment of water for potable use, renovation of waste waters, safe handling of solid and hazardous wastes, remediation of existing environmental pollution, and stewardship of Earth's land and water resources.

Environmental engineering graduates with a specialty in geological engineering would guide the development and conservation of the Earth's natural resources. This would include hydrogeology, waste isolation, aquifer cleanup, and exploration for and development of mineral and petroleum resources.

Graduates with a metallurgical engineering specialty would work in the material and mineral process industries, where they

would develop and implement environmentally sound processes for producing the metals, ceramics and composite materials used by society. Engineers in this field would be leaders in the area of recycling of materials for re-use by society.

Environmental engineering graduates with a specialty in mining engineering would involve themselves with the extraction of raw materials from



Yan Zheng (MS Enviro Engr, China) is busy at work on the gas chromatograph.

the Earth and the oceans. Activities would include developing and implementing environmentally sound mining plans and reclaiming existing and abandoned mines.

The South Dakota School of Mines & Technology is continuing its long history of providing excellence in engineering and science by expanding its academic curriculum to include a new engineering discipline - environmental engineering. A message in Dr. Gowen's opening convocation in the Fall of 1997 provided the signal for Dr. Mott to pursue the development of a BS EnvE degree at SD Tech and indeed has laid the foundation for further academic success at this institution. The campus community has much to look forward to as students begin to make their mark in environmental engineering on campus, in South Dakota, across the U.S. and around the world.



ENOUGH IS ENOUGH!

FOOTBALL FOCUSES ON MENTAL AND PHYSICAL FITNESS

The South Dakota Tech Hardrocker Football Team is going to be ready when they face-off against Concordia on September 2 in their first game in the newly formed Dakota Athletic Conference (DAC 10). First year Hardrocker Head Coach Darren Soucy has come to Rapid City with some very opportune knowledge of seven of the nine other teams in the DAC 10 – he knows their coaches and knows their programs.

Soucy has come full-circle from whence he first started his coaching career as receivers and tight-ends coach at Northern State University in Aberdeen back in 1993 and 1994. He coached in the same capacity at Humboldt State University (CA) and later returned to the mid-west to Mayville State University (ND) where he served as offensive coordinator for the past three seasons.

“Coaching in the newly formed DAC 10 is going to be a challenge, and that makes it exciting,” said Soucy. “Every team out there looks for an edge on the field and ours just might be that I am familiar with the personnel and programs at each DAC 10 school we will be up against with the exception of Dakota State and Huron.”

In addition to his familiarity with the newly formed athletic conference, Soucy will bring to the team a more focused approach to their games centered on preparation and commitment toward a similar goal. We have all heard the expression that the game is 90% mental, yet, as Soucy is quick to point out, 99% of college teams across the country spend 100% of their time preparing for the physical. Strength alone will not win football games which is why Soucy plans

to take more of a mental approach.

“Physically there is no difference between South Dakota Tech and the rest of the teams in the conference,” said Soucy. “I believe if we put some time in preparing ourselves mentally we can cross over that fine line of last year’s 2-8 record. If we can get ourselves off that line and onto the right side of it, and that means physical preparation and mental preparation, then I think we can become a better team.”

The 2000 Hardrocker Football team has adopted a new motto: ‘Enough is Enough!’ For the seniors on the team they will be facing their third coach in four years, and coupled with a strong nucleus of freshmen, sophomores, and juniors you have a team that deserves to win and is committed to winning. They don’t want to hear about how close the game was, or it was just one play. They are ready to take it to the next step. It is time to win, and it is time to be successful.

During Soucy’s first week on campus he met with each player during which time he asked each one of them to write out their goals. What he discovered was that every single player is committed 100% to the success of the team. They want to see 100% attendance in weight training sessions, and 100% attendance in the classroom.

“Upon meeting with the guys individually my impression was that this is a team that does not want to rebuild, they want and expect success immediately and I want to bring it to them. They want to do everything they can to be a better football team,” said Soucy. “The biggest thing that excites me about meeting with the players is that they are ready. They are willing and ready to build upon the program that



photo by Kari Larese

Darren Soucy was welcomed as the new head football coach during a winter press conference.

exists and that is what we are going to do.”

Soucy brings to Tech an offensive mind which, coupled with three-year Defensive Coordinator Shane Stephen, will continue to build upon the foundation established by former Head Coach Ron Richards. Building upon ideas Stephen devised, the team has begun to participate in different activities to develop team cohesion. Racquetball and basketball tournaments were underway before Soucy stepped foot on campus, and were great opportunities for him to begin to encourage team building and get to know the players on a different field.

For Head Coach Soucy the decision to come to South Dakota Tech was made easier by the presence of Stephen. A formidable defense has already been established in the three years Stephen has served as defensive coordinator in which time stability and respect between coach and players have also dug roots in O’Harra Stadium. Upon his arrival to campus one of Soucy’s priorities was to make sure Stephen was still around. “The players really like him and respond well to him,” said Soucy. “I think together we will be able to successfully build upon what he and Ron Richards have established.”

So whether you think Soucy’s knowledge of the competition in the DAC 10 is going to be the Hardrocker’s edge this season, or his more focused approach to game-time preparation, fans of SD Tech football will have much to cheer about this upcoming 2000 season. One hundred percent commitment from players and coaches alike will move the Hardrockers into the DAC-10 conference. Enough is Enough! It is time to be successful!



Coach Darren Soucy (second from left) leads the Hardrockers during spring practice.

photo by Kari Larese

Tech Freshman Win Regional and National Science Fair Award Attend International Competition in Brazil

Culture shock, a language barrier, and very impressive competition greeted John Keefner (GeoE, Black Hawk) and Mark Hanhardt (Phys, Sturgis) as they stepped off the airplane in Porto Alegre, Brazil. The two students were traveling to the 12th International Science Fair of South America as representatives of the United States. The 24-hour trip spanning five time zones and the equator actually began nine months earlier when they took first place at the 44th Annual High Plains Regional Science and Engineering Fair held on the campus of the South Dakota School of Mines & Technology.

John and Mark are currently enrolled as freshmen at SD Tech, but at the time were seniors attending Sturgis Brown High School. Their project titled "Zen and the Art of Diamagnetic Water Repulsion," recorded an effect that was previously undocumented and unstudied. The project described a specific superconductor and how it affected the formation of frost on its surface. Superconductors are materials that will conduct electricity with zero resistivity but will only do so at temperatures below about -180 degrees Celsius.

"When Mark and John first told me about the affect they had observed I was sure it was some artifact of their experimental set up," said Dr. Robert Corey, Associate Professor of Physics. "They persisted, carefully explaining every element of the experiments they had performed. I still do not understand the underlying physics but I now believe they were observing a real effect."

The reaction observed by Dr. Corey turned out not to be an uncommon one. As the pair competed in the 1999 International Science and Engineering Fair (ISEF) in Philadelphia, Pennsylvania, more than 30 judges came by to see their project - 22 more than the eight that were assigned to judge their work. At the competition which featured more than 1,000 projects from 48 different countries,

Mark and John came away with two awards, 1st place and one of only two recipients of a Pinnacle Award. The Pinnacle gave them their ticket to Brazil.

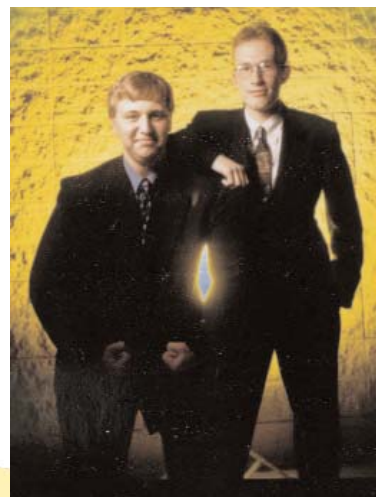
In November, 1999 Mark and John set-off for Brazil as representatives of the United States. After a grueling 24-hour trip the pair arrived in Porto Alegre yet their journey was not over - another two-hour delay caused by an absent rental car prolonged their yearning for a much needed nights sleep.

"When we arrived in Brazil I was amazed at the technology that we found there," said Hanhardt. "From what I saw everything was more technologically advanced than we are here in South Dakota, but that reflected the more affluent communities they exposed us to. The poverty was quite evident though as poor children often approached us asking for money when we visited markets, and the lack of an appropriate sewage and garbage service was hard to hide."

The International Fair of South America, or 14th Annual Mostratrec as it was called in Novo Hamburgo, was held in an aging gymnasium of a private school called the Liberato. It sat atop a hill that overlooked the city of Novo Hamburgo, and despite the dilapidated building, housed a technologically advanced science fair that had been touted throughout the country.

The Mostratrec featured participants from all of South America and Mexico, and included representatives from many other countries that attended in the same capacity as John and Mark. It did not only include individuals in middle and high school as the science fairs in the United States had but rather displayed projects by students from ages 13 - 25. In addition to the age difference, the projects displayed were quite a contrast from what students in the United States had done.

"The science projects that we saw in Brazil were distinctly different from those found in the States. Our project was



Mark Hanhardt and John Keefner

photo courtesy of Mark Hanhardt and John Keefner

high-tech and theoretical, which was completely different than the problem-solving focus of the rest of them," said Keefner. "As a result our project was grasped by few and probably not completely understood by anyone. We didn't get the spark of understanding that we saw in our judges at ISEF. Zen e a Arte do Diamagnetico Repulsao do Agua (the Portuguese translation of 'Zen and the Art of Diamagnetic Water Repulsion') was the only theory/pure science project at Mostratrec."

A sample of the projects they saw in Brazil included water purifying projects; improved forensics material utilized at crime scenes; a CD that could hold 250 songs versus the traditional 74 minutes; and many projects that centered around traffic problems, and pollution.

The pair's eight-day trip taught them many lessons and gave them a first-hand appreciation for the opportunities we do have in the United States. A different language, mind-set, culture, and ideals separate the two countries as plainly as their geographic locales, but for eight days students were able to gather and learn from the many different experiments on display.

"The trip was an exciting chance to travel the world and observe other types of science at work," said Keefner. "I can appreciate this experience and hope that other students will get the same opportunity as Mark and I were fortunate to have."



THEN & NOW

Military Training Detachments – ROTC

Military training dug its roots on the campus of SD Tech in 1918 when the War Department issued contracts to the university for training of detachments. The initial agreement stipulated the training of 120 men that later expanded to 200. Shortly thereafter the Students' Army Training Corps (SATC) was authorized and was in operation by October 1918. The SATC provided for military training of college students and later amended to include those enrolled in vocational training as well.

Unbeknownst at the time, the SATC fostered an appreciation for the military on campus that did not diminish. Today the Reserve Officer Training Corps (ROTC) prepares students for a career as an Army Officer, or for service in the Army Reserves or Army National Guard. The program is designed to develop leadership, managerial potential, and a basic understanding of associated professional knowledge, as well as an appreciation of the requirements for national security.



photo courtesy of SDSM&T Archives

Military detachments first appeared on campus in 1918 (above) and today exist in the presence of the Reserve Officer Training Corps (ROTC). At right cadets board Blackhawk helicopters for weekend training.

College Name

Up until 1943 the university had been known under its original name, the School of Mines, but in February of that year Governor Sharpe approved a bill that officially changed the name of the institution to its familiar name today - South Dakota School of Mines & Technology.

The change signified the evolvement of a university that began in 1887 with an enrollment of 20 and a limited number of degree programs. By 1943 a name change was well deserved as the school for miners had grown to encompass an array of engineering, science, and technology based disciplines.

courtesy of SDSM&T Archives

Today we usher in a new century with the addition of one of only a handful of truly interdisciplinary environmental engineering degree programs in the United States. The university boasts sixteen undergraduate, ten masters, and three doctorate degree programs.



SDSM&T has seen many changes since its inaugural year in 1886, including its name. The School of Mines exists today as the South Dakota School of Mines & Technology.

Museum of Geology

A fossil collection of early Tech professor Gilbert E. Bailey lay the groundwork for what would become the Museum of Geology. It was originally located on the first floor of the Main or Liberal Arts building and contained eight central display cases and two wall cases. The collection included rocks and minerals representative of the Black Hills; fossil collections; and the relief maps created for the St. Louis Exposition. In 1923 Guy March opened the Museum for summer visitors, and by 1924 there were 8,000 visitors annually.

Today the Museum of Geology is housed in the O'Harra Building and welcomes more than 50,000 visitors every year. It is a teaching and research facility with collections of more than 250,000 vertebrate fossils and 6,000 minerals. The more spectacular specimens on display include a pregnant oreodont, a complete titanotherium skeleton, mosasaur and plesiosaur skeletons, and a systematic collection of minerals from all over the world.



photo courtesy of SDSM&T Archives

The years 1915-1943 saw the South Dakota School of Mines & Technology evolve into a university that now boasts excellence in engineering and science education. An abundance of significant contributions took hold of the campus during the 28-year period identified above and aided in the establishment of Tech as a world-class institution.

This second re-photographing look captures the first presence of military detachments on the Tech campus versus today's ROTC battalion; the name change from the School of Mines to the South Dakota School of Mines & Technology; the establishment of the Museum of Geology; and the evolvement of *The Hardrock* alumni magazine.



Photo by Kari Larese

Alumni Association

More than 65 years ago a need for an organization dedicated to fostering communication and interaction among SDSM&T alumni and between the university and alumni was recognized at a meeting at the home of Guy and Gail March. With this in mind, an Alumni Association was formed following the first Alumni Homecoming banquet at the Alex Johnson Hotel on M-Day, October 5, 1934.

The purpose of the Alumni Association is to promote communication and interaction between alumni, students, faculty and administrators of the School with the objective of strengthening the institutions academic, research, and service roles. The Association also provides an alumni network and support services for SDSM&T alumni throughout the world.

Guy March served as Director until his death in 1981. Since then the position has been occupied by Dick Kitchen (1982-1984), Duff Erickson (1984-1998), and Tim Vottero (1998-present).

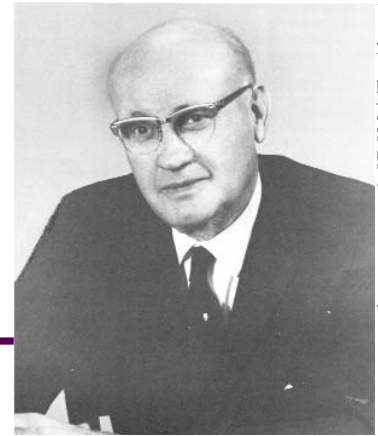


photo courtesy of SDSM&T Alumni

Guy March (above) was the first Director of the Alumni Association. Today, Tim Vottero (BS CHEM, '84) (left) provides direction for alumni relations.

file photo



An early faculty member's fossil collection (left) set the stage for what is today a renowned research and teaching facility (above).

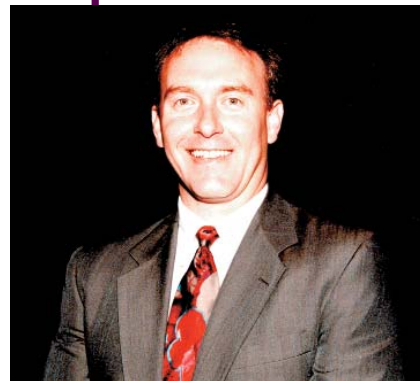


photo courtesy of SDSM&T Alumni

CAMPUS BRIEFINGS

Dr. Charles A. Kliche, Associate Professor, Department of Mining Engineering, was recognized by the International Society of Mine Safety Professionals as a "Professional Member" and was granted "Life Membership Status" by the Society for his contributions.

Dr. Julia T. Sankey, Haslem Postdoctoral Fellow in the Museum of Geology and the Department of Geology and Geological Engineering, was the first author on a talk entitled, "Paleoecology of Mammals from the Dinosaur Park Formation (Judith River Group, Late Campanian), Southern Alberta" at the Society of Vertebrate Paleontology annual meeting in Denver in October. She spent three weeks in November doing magnetostratigraphic fieldwork in Big Bend.

Michelle Howell, Director, Surbeck Student Center, was selected to Chair the 2001 National Association for Campus Activities Upper Midwest Regional Conference.



Dr. V. Ramakrishnan, Distinguished Professor, Department of Civil and Environmental Engineering, has been appointed as a Member Emeritus of the National Research Council Transportation Research Board's (TRB) Committee on Properties of Concrete. Dr. Ramakrishnan was invited as a guest of TRB at the TRB's 79th Annual meeting and the Chairman's Luncheon, at which he was recognized as the Member Emeritus. Dr. Ramakrishnan was selected to serve as a panel member for the review and selection for funding of the individual investigator award proposals submitted to the Mechanics and Material program of the National Science Foundation. Dr. V. Ramakrishnan also gave two invited seminars at the WorldWide Forta Engineers meeting held in January in Pittsburgh, Pennsylvania, entitled "Back to Basics in Fiber Concrete Technology" and "Plastic Shrinkage Reduction Potential and Strengths and Toughness Properties of Newly Developed Synergy Fiber Reinforced Concrete". Additionally, Dr. Ramakrishnan was

sponsored by the National Science Foundation to visit Curtin University of Technology in Western Australia, to plan and organize collaborative research on the use of genetically engineered microbial enzymes in calcite precipitation for repair of concrete structures and for stabilizing sand sub-bases for highway payments. **Dr. Sookie S. Bang**, Associate Professor, Department of Chemistry and Chemical Engineering, visited the Microbiology Department of the university and instructed them about the various aspects of the research done at SDSM&T. During his Australia visit, Dr. Ramakrishnan presented seminars in the following universities: RMIT University, Civil and Geological Engineering Department, Melbourne, Victoria, "Recent Advances in High Performance Concrete Fiber Composites"; Curtin University of Technology, Civil Engineering Department, "Philosophy and Principles of Design of Durable Structures"; Australian Defense Force Academy - The University of New South Wales, Canberra, ACT, "What is New in Concrete Fiber Composites - Recent Research in U.S.A."

The Career Service Council announced that the January, February, and March Traditions of Excellence award recipients are **Helen Birkholz**, **Ruth Fontenot-Prince**, and **Kathy Fischbach** respectively. Helen is employed as a secretary in the Graduate Education Office where she has worked since she started with Tech in 1967. Ruth is secretary for the Museum of Geology. She has held that position (half time) for almost five years. Her afternoons are spent in the office of the Alumni Association as an information analyst. Kathy is secretary for the Civil and Environmental Engineering Department. She has held that position since September 1985.

Dr. Briant Davis, former dean of graduate research and education and professor emeritus, Department of Atmospheric Sciences, spoke at a meeting of the Black Hills Regional Chapter of Sigma Xi in January. Dr. Davis discussed air quality measurements he made recently while serving as visiting professor at a Chinese technological university in northeastern China.

The Faculty Development Committee welcomes **Dr. Stan Howard**, Chair and Professor, Department of Materials and Metallurgical Engineering, to the SDSM&T Faculty Development Committee.

Dr. Larry Stetler, Assistant Professor, Department of Geology and Geological Engineering, attended the Rocky Mountain Section of the Association of Engineering Geologists (AEG) meeting in Golden, CO in February. The purpose of the meeting was to participate in AEG Student Night. The meeting served two functions: 1) several regional engineering firms were there to talk with students about jobs in Geological Engineering, and 2) to hold a student competition for presentation of research.

Dr. Ken Han, Distinguished Professor, Department of Materials and Metallurgical Engineering, has been elected to serve on a National Research Council Committee on Technologies for the Mining Industries. He is one of the 12-member panel that will make recommendations to the government on issues concerning mining related technologies after a year-long study.

Dr. Karen Whitehead, Vice President for Academic Affairs, led a team of administrators and faculty from SDSM&T to the Collaboration Conference in Minneapolis, in February. The conference theme was



"Sustaining Innovation: Content and Pedagogy for a New Century." **Dr. Dean Bryson**, Dean, College of Interdisciplinary Studies, **Darrell Sawyer**, Director, Office of Career Planning and Placement, **Dr. Rodney Rice**, Associate Professor, Department of Humanities, and **Dr. Roger Dendinger**, Assistant Professor, Department of Social Sciences, also attended.

Five alumni of SDSM&T were honored as recipients of the 2000 Outstanding Recent Graduate Award during an Engineers Week luncheon in February. The recipients were: Civil Engineering - **Jeanne A. Berg**, P. E. (CEE '90, MS CEE '92); Chemical Engineering - **Dean M. Harts** (ChE '89);

PUBLICATIONS

Electrical and Computer Engineering - **Michael J. Lichter** (EE '89); Materials and Metallurgical Engineering - **Brian L. Pelton** (Met '89, MS Eng '90); and Geological Engineering - **Juan C. Villa** (GeoE '89, MS GeoE '91).



Dr. Sanjeev K. Khanna, Assistant Professor, Department of Mechanical Engineering, has been named to the 1999-2000 Lexington Who's Who Registry of Executives and Professionals. Dr. Khanna has been recognized as an emerging leader based on his demonstrated leadership and achievements in research, teaching, and professional affiliations, in the area of mechanical engineering.

Dr. Edward Corwin, Professor, Department of Mathematics and Computer Science, has taken over the position as Chair pro tem for Faculty Advisory Council.



Dr. James Munro, Interim Dean, College of Materials Science and Engineering, and Professor, Department of Chemistry and Chemical Engineering, **Dr. Sidney Goss**, Professor, Department of Social Sciences, and **Dr. Brad Morgan**, Professor, Department of Humanities, attended a faculty development conference in Williamsburg, VA in February, hosted by the Council on Undergraduate Research. Held on the campus of the College of William and Mary, the theme of the conference was "The Vital Faculty: Issues after Tenure."

Dr. Susan L. Reid, Director, Choral Activities, was invited to present at North Central American Choral Directors Association Convention in March. Her topic was "Baroque and Classical performance practice in G.F. Handels' "Messiah." The convention was held in Madison, WI.

Dr. Srinivasa Iyer, Professor, Department of Civil and Environmental Engineering, received a special recognition award at the Engineers Week 2000 Annual Banquet. Dr. Iyer has served as co-chair of SDSM&T Engineers Week activities at SDSM&T from 1978 to 2000. Dr. Iyer and SDSM&T President **Dr. Richard Gowen** helped organize the first local Engineers Week activities in 1978. **Dr. Sidney Goss**, Professor, Department of Social Sciences, was the keynote speaker at the banquet. He discussed the importance of engineers in society and the need for more engineers in the next decade as the world population continues to explode. Engineers in all disciplines will be in high demand due to the continued local and nationwide growth.

The Department of Humanities began the first of a three-part series on communication issues funded by the Dow Chemical Corporation. "From Schoolroom to Workplace: How to Communicate Your Professional Potential" was presented in February. Presenters included Mark Sunday, recruiter for Raytheon; Alan Bergeron, Rockwell Collins; Paul Plagmann, Martin and Associates; and **Kelly Commet** (CSC, Rapid City). The second colloquium, "Communication Challenges in the New Millennium," has been scheduled to coincide with the on-campus meeting of the Industrial Advisory Board on April 13, 2000.

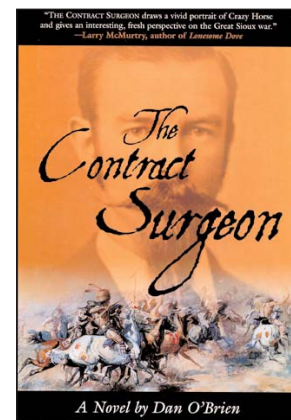
Sympathy:

Jeanette M. Daley, career service staff assistant at the Palmerton Hall Courtesy Desk, passed away Friday, February 24, 2000. Jeanette's son, James, is a current SDSM&T student. Our condolences are extended to James and the rest of the Daley family.

Deepest sympathy to the family of **Dr. Howard Peterson** on the loss of his wife Lenatt. Both Lenatt and Howard worked at the SD Tech campus for more than 20 years. Lenatt worked in the bookstore, and Howard was a former Dean of Students.

Dr. Roger Johnson, Associate Professor, Department of Mathematics and Computer Science, recently had his article titled "Investigating randomness via simulation using the TI-83" accepted for publication in the journal *Teaching Statistics*. The article presents several random phenomena (e.g. sequences of consecutive heads or tails in the tossing of a fair coin) with one of the main points being that individuals don't understand randomness very well. The TI-83 calculator simulations of these random phenomena were developed during Johnson's redesign of the introductory statistics (Math 281) class at SDSMT with a 1998 Governor's Grant. Dr. Johnson had a second article titled "Illustrating conditional calculations with 'Jolly Roger'" accepted for publication in *The Mathematical Gazette*, a British Journal. Fundamental probability calculations, that implement a divide and conquer approach, are illustrated in determining expected outcomes in 'Jolly Roger', a dice game.

Local author, Dan O'Brien recently published a book about **Valentine McGillicuddy**, SDSM&T's first Dean, entitled "Contract Surgeon". O'Brien



explores the friendship that developed between McGillicuddy, a contract surgeon for the U.S. Army, and the legendary Sioux leader Crazy Horse – the most feared of all Sioux war chiefs. The events of history are woven into an account of the last day in the life of Crazy Horse.

RESEARCH NOTES

Dr. Paul Smith,

Professor Emeritus, Institute of Atmospheric Sciences, has received three grants from the National Science Foundation for research. He received \$23,278 in additional funds for a project entitled "Salary Supplement Support for Postdoctoral Scientist, Q. Mo," \$129,000 in additional funds for a project entitled "T-28 Support of the STEPS Project," and received \$160,700 additional funds with **Dr. Andrew Detwiler**, Professor, Institute of Atmospheric Sciences, for their project entitled "Armored T-28 Aircraft Facility for Research Requiring Storm Penetrations."



Dr. Stuart Kellogg, Professor and Program Director, Industrial Engineering Program, was recently awarded \$5,000 from the Texas Engineering Experiment Station for his project entitled "FC Affiliate."

Dr. Robb Winter, Professor, Department of Chemistry and Chemical Engineering, was awarded \$66,689 in additional funds from the National Science Foundation for his project entitled "REU Site: Molecular Level Modification of Surfaces."

Dr. William Capehart, Assistant Professor, Institute of Atmospheric Sciences, was awarded \$185,000 from the National Science Foundation for his project entitled "Scaling Issues in the Direct Use of Satellite Data in Mesoscale Model Land Surface Parameterizations."

Dr. Jon Kellar, Associate Professor, Department of Materials and Metallurgical Engineering, and **Dr. William Cross**, Research Scientist, Department of Materials and Metallurgical Engineering, received \$8,020 from Micron Technology, Inc. for their project entitled "Bond Pad Analysis." In addition, Dr. Kellar and **Dr. Lidvin Kjerengtroen**, Professor, Department of Mechanical Engineering, received \$10,000 in additional funds from the National Science Foundation for their project entitled "A Multi-Scale Approach for Understanding the Role of the Interphase in Polymer Matrix Composites - REU Supplement."

Dr. James Martin, Professor and Curator of Vertebrate Paleontology, Museum of Geology and **Julie Smoragiewicz**, Vice President for University Relations, received \$49,997 from the National Science Foundation for their project entitled "Fossil Reptiles from the Late Cretaceous (Campanian-Maestrichtian)

of Vega Island, Antarctic Peninsula." In addition, Dr. Martin recently received \$2,000 from the Department of the Interior - Bureau of Land Management for his project entitled "Paleontology Curation Management." **Smoragiewicz** was also recently awarded \$10,000 from the South Dakota State Historical Society Deadwood for the North Wing renovation of the Children's Science Center.

Dr. John Bendler, Associate Professor, Department of Chemistry and Chemical Engineering, and **Dr. David Boyles**, Associate Professor, Department of Chemistry and Chemical Engineering, received \$80,000 in additional funds from the National Science Foundation for their project entitled "Molecular Design and Synthesis of Novel, High-Performance Polycarbonates."

Francine Campone, Associate Dean, Dean of Students Office, received \$61,001 from the New Mexico Highlands University (prime-NASA) for her project entitled "AISTEC Year 6."

Dr. Srinivasa Iyer, Professor, Department of Civil and Environmental Engineering, was awarded \$42,475 from South Dakota State University (prime-FHWA) for his project entitled "South Dakota Transportation Technology Services (13)."

Dr. Jan Puszyński, Professor, Department of Chemistry and Chemical Engineering, received \$20,000 from the Department of Defense - Naval Surface Warfare Center for his project entitled "Investigation of Ti-Si and Nb-Si Reacting Systems for their Potential Application as Ignition Delay Mixtures."

Kata McCarville, Director, Instructional Technology Services, received \$175,000 from North Dakota State University (prime-NSF) for her project entitled "High Performance Network Connection in Support of Meritorious Research DakotaLink."

Dr. Ed Duke, Manager, Engineering & Mining Experiment Station, was awarded \$20,842 in additional funds from the National Science Foundation for his project entitled "Spectroscopic Methods for Mapping Metamorphic Rocks."

Dr. Tom Fontaine, Assistant Professor, Department of Civil and Environmental Engineering, **Dr. Arden Davis**, Professor, Department of Geology and Geological Engineering, and **Dr. Maribeth Price**, Assistant Professor, Department of Geology and Geological Engineering, received \$9,953

from the United States Department of Interior - Badlands National Park for their project entitled "Determine Canada Thistle distribution and Environmental Risks of Treatment."

Vickie Bender, Director, High Plains Center for Technology, received \$50,000 from the South Dakota Department of Education and Cultural Affairs for her project entitled "South Dakota Grades Program."

Dr. John Helsdon, Professor, Institute of Atmospheric Sciences, and **Dr. Andrew Detwiler**, Professor, Institute of Atmospheric Sciences, were recently awarded \$135,600 from the National Science Foundation for their project entitled "Airborne Observations and Storm Modeling in Support of the Severe Thunderstorm Electrification and Precipitation Study (STEPS)."

Dr. Sherry Farwell, Dean, Graduate Education and Sponsored Programs, recently received \$7,568 in additional funds from the University of North Dakota (prime - NASA) for his project entitled "A Public Access Resource Center (PARC) Empowering the General Public to Use EDOSIS."

Dr. Lee Vierling, Assistant Professor, Institute of Atmospheric Sciences, was awarded \$147,500 from NASA for a project entitled "Earth Systems Connections: An Integrated K-4 Science, Mathematics and Technology Curriculum."

Dr. Tom Propson, Professor Emeritus, Department of Civil and Environmental Engineering, was awarded \$1,861 in additional funds from the United States Geological Survey (USGS) for his project entitled "Water Resource Investigations and Research."

Dr. Neil Chamberlain, Associate Professor, Department of Electrical and Computer Engineering, received \$14,000 from Comuniq Inc. for his project entitled "Facsimile Group3 Image Decoding Program."

Dr. V. Ramakrishnan, Distinguished Professor, Department of Civil and Environmental Engineering, received \$100,000 from the South Dakota Department of Transportation for his project entitled "Determination of Optimized Fly Ash Content in Bridge Deck and Bridge Deck Overlay Concrete."

Dr. M.R. Hansen, Associate Professor, Department of Civil and Environmental Engineering, received \$5,570 from the National Science Foundation for his project entitled "Planning Visit for USA-Mongolia Cooperative

Research Project on High Performance Concrete for Construction and/or Rehabilitation of Transportation Structures.”

Dr. Cathleen Webb, Associate Professor, Department of Chemistry and Chemical Engineering, and **Dr. David Dixon**, Associate Professor, Department of Chemistry and Chemical Engineering, received \$25,000 from the Dreyfus Foundation for their project entitled “Automated Laboratory Reactor with Data Acquisition.”

Dr. Bruce Berdanier, Assistant Professor, Department of Civil and Environmental Engineering, received a \$3000 grant plus travel expenses from Rotary International for a one month surface water quality and water system feasibility study in Deschepelles and St. Marc, Haiti. He plans to travel this summer for one month and to take two undergraduate students with him as field assistants. Dr. Berdanier also received approximately \$3,000 in matching grant funds from the Grant Foundation that supports Hospital Albert Schweitzer.

STUDENT SPOTLIGHT

Ms. Farrah Johnson (M.S. MES, Rapid City) and **Dr. William Cross**, Research Scientist Materials and Metallurgical Engineering, recently presented a poster “A Multi-Scale Approach for Understanding the Role of the Interphase in Polymer Matrix Composites” at the Gordon Research Conference on Composites, January, 2000, Ventura, CA. Co-authors of the poster were **Chad Griswold** (Met, Sturgis), **Rajneesh Kumar** (M.S. MES, India), **Dr. Lidvin Kjerengtroen**, Professor, Department of Mechanical Engineering, and **Dr. Jon Kellar**, Associate Professor, Department of Materials and Metallurgical Engineering.

Ed Friend (GeoE, Pierre) presented at the Rocky Mountain Section of the Association of Engineering Geologists Student Night in Golden, CO. Friend’s talk was entitled “Rehabilitation of Otter Creek Dam” describing work he did last semester while on a co-op with Granite Construction Co. in Salt Lake City, Utah. Ed was awarded 2nd place. Other students who attended the meeting included: **Kristen Keiry** (GeoE, Nisland), **Stacy Splittstoesser** (GeoE, Rapid City), **John Weeldreyer** (GeoE, Rapid City), **Brad Stock** (GeoE, Sturgis), and **John Keefner** (GeoE, Black Hawk). **Dr. Larry Stetler**, Assistant Professor, Department of Geology and Geological Engineering, also attended the meeting.

Nine students from SDSM&T attended SHED (Students for Higher Education Days) Days in Pierre February 6-8, 2000. SHED Days are an opportunity for students to meet with legislators and discuss important issues facing Tech students. Attending from Tech were **Chuck Cox** (ME, Yankton), **Paul Chilson** (MinE, Sisseton), **Sarah Rouse** (Met/Chem, McCook Lake), **Christy Rebel** (Met, Rapid City), **Dom Miller** (CSC, Norfolk, NE), **Dana Rigggenberg** (ME, Aberdeen), **Nicole Stengle** (EE, Rapid City), **Abe Kean** (CENG, Pierre), and **Brent Scheele** (CEE, Belle Fourche).

Bob Pentland (Met, Wheatland, WY) was named a 1999 NAIA Football All-American Scholar Athlete. He has earned a 3.57 grade point average. Pentland is the starting free safety on the Hardrockers football team. During the 1999 season he recorded 61 tackles, one fumble recovery, and three interceptions.

Angela Holeton (IS, Rapid City), and **Kelly Comet** (CSC, Rapid City) were recognized as Millennium All-Stars of the future during Rapid City City Council Meetings in January and March. Angela attended St. Thomas More High School and is active in music, drama, art, and community service. She participates in the Tech Ski Club, Master Chorale, Tech’s Judicial Team, and is president of the campus Newman Club. Kelly is a non-traditional student at Tech who will graduate with honors at the May commencement ceremony. She is president of Alpha Sigma Lambda, an adviser in the Tech Mentor Program, and member of Society of Women Engineers. Her community involvement includes participation in the Keystone Chamber of Commerce, Co-chairwoman of the Keystone Community Center project, and chairwoman of the Keystone Brochure Committee. Despite numerous job opportunities to lure her out of the area, Kelly has decided to remain in the Black Hills after she graduates and has accepted a position with Martin & Associates in Rapid City, SD.

Three industrial engineering students from the Work Methods and Measurements class of **Dr. Carter Kerk**, Assistant Professor, Department of Industrial Engineering, spent a month studying the facility and equipment at Black Hills Workshop. The purposes of their class project were to make recommendations that would improve production flow, increase customer demand, and make the area more suitable ergonomically. Those participating included **Jayme Zimprich** (IENG, Hayti), **Frode Rogstad** (IENG, Norway), and **Amy**

Wilson (IENG, Hamilton, MT).

A senior design team from the Mathematics and Computer Science Department participated in a Student Research Poster Session at the State Capitol in Pierre. The team project was called Tax Net. It is a software product designed to offer small internet retailers assistance in collecting and dispersing sales tax generated by online sales. This product encompasses two major interfaces. The Retailer Internet Interface will allow a retailer to enter sales information into a database. At the end of each month, the retailer will submit a single tax payment, which will then be dispersed by TaxNet to each state revenue department. The Administrative Interface will handle fund collection and dispersal. Team members included **Michelle Wantie** (CSC, Rapid City), **Richard Stevens** (IS/CSC, Rapid City), **Kelly Commet** (CSC, Keystone), and **Jason Israelson** (CSC/Math, Sturgis). **Dr. Manuel Penaloza**, Associate Professor, Department of Mathematics and Computer Science, was the faculty advisor.

Chris Hofer (CENG, Freeman) received the \$1,000 Black Hills Chapter of South Dakota Engineering Society Bill Craig Scholarship. Chris is active in several campus organizations, including Secretary/Treasurer for the Solar Motion Team at SDSM&T.

Orientation leaders for the 2000 academic year have been selected. Orientation leaders are: **Dan Alsup** (ENGR, Spearfish), **Nick Bottolfson** (ME, Yankton), **Jessica Christensen** (GEOL, Rapid City), **Erin Dimock** (GEOE, Inver Grove Heigh), **Scott Fritz** (ME, Sioux Falls), **Matt Goeden** (CEMG, Yankton), **Aaron Gough** (ME, Salem), **JR High Elk** (CEE, Dupree), **Chris Hill** (CSC, Douglas, WY), **Hank Hollenbeck** (CENG, Rapid City), **Heidi Jochim** (MATH, Rapid City), **Abe Kean** (CENG, Pierre), **Jessica Kienow** (CHE, Aberdeen), **Bryan Linn** (ENGR, Dupree), **Cassady Marshall** (CEE, Laramie, WY), **John McCanna** (GEOL, Eden Prairie, MN), **Chris Monson** (CHE, Pierre), **Darren Morrison** (EE, Sheridan, WY), **Matt Mulder** (ME, Corsica), **Dee Andra Sandgren** (IS, Lemmon), **Jill Soldatke** (IS, Sioux Falls), **Kiley Steffen** (GEOE, Gregory), **Brandon Vahlkamp** (CSC, Gillette, WY), **Dusty Waldrop** (ME/EE, Spearfish), **Steve Walker** (GEOE, Green River, WY), and **Katie Zeller** (IENG, Pierre).

Brent Scheele (CEE, Belle Fourche) is the newly elected Student Association President and **Abe Kean** (CENG, Pierre) has been elected the new Vice President.

You Are Invited . . . Calendar of Events

MAY
Monday, May 1
 Leadership Recognition Reception
Tuesday, May 2
 12:00 pm United Campus Ministry Forum
 "Epiphanies: When You Talk To God
 You're Praying When God Talks To You
 You're Schizophrenic."
Friday, May 5
 7:30 pm Spring Concert - Symphonic
 Band/Jazz Band - Surbeck Ballroom
Friday - Saturday, May 5-6
 Track & Field at Howard Wood Relays
Sunday, May 7
 Be Kind to Animals Week Program -
 Children's Science Center (CSC) - Noon to 3 pm
Monday - Friday, May 8-12
 Final Exam Week
Friday, May 12
 3:00 pm President's Reception
 Surbeck Ballroom
Saturday, May 13
 10:00 am Graduation
 Rushmore Plaza Civic Center
Saturday, May 13
 Stamps Away at CSC 1:00 pm - 4:00 pm
Saturday, May 13
 Track & Field
 at SDIC Championship
Sunday, May 14

Mother's Day Celebration at CSC
 10:00 am - 2:00 pm
Sunday - Saturday, May 14-27
 Fossil Lake, Oregon Field Dig
Monday, May 15
 Summer Sessions begin
Monday, May 15
 West River Math Contest
Wednesday - Sunday, May 17-21
 Formula SAE Competition
Thursday - Friday, May 25-26
 Track & Field
 at NAIA National Championship
Monday, May 29
 Memorial Day - Holiday
JUNE
Thursday, June 1
 Summer Program Kick-off at CSC
 9:00 am - 7:00 pm
Monday, June 5
 Summer Reading Program Kick-off
 Planetarium shows at Rapid City Public
 Library main branch by CSC
Wednesday - Friday, June 7-30
 Technology for Teaching & Learning
Sunday - Thursday, June 11-15
 AP Institute
Sunday, June 18
 Father's Day Celebration at CSC
 10:00 am - 2:00 pm

Monday - Friday, June 19-30
 Family Paleontology Field Dig
Saturday - Monday, June 24-26
 National Concrete Canoe Competition
JULY
Tuesday, July 4
 Fourth of July - Holiday
Wednesday - Friday, July 5-28
 Technology for Teaching & Learning
Wednesday, July 5
 Reunion Warm Up Day, 1:00 pm - 7:30 pm
Thursday, July 6
 Reunion Day One, 6:30 am - 8:00 pm
Friday, July 7
 Reunion Day Two, 6:00 am - Evening
Saturday, July 8
 Reunion Day Three, 6:00 am - 10:30 pm
Monday - Friday, July 10-21
 Jurassic Dinosaurs and Mammals Field Dig
Monday - Friday, July 10-21
 South Dakota Dinosaurs in the Hell Creek
 Field Dig
Monday - Friday, July 17-28
 Monster Marine Reptile Field Dig
Monday - Friday, July 17-28
 Giant Pigs and Rhinos in Badlands National
 Park Field Dig
Monday - Friday, July 31-August 11
 Marine Turtles, Mosasaurs, and Plesiosaurs
 Field Dig

PERSONNEL CHANGES

WELCOME:

Qusi R. Al-Haj, Faculty, part-time Instructor,
 Department of Electrical and Computer
 Engineering (1/13/00)
Monica L. Beardt, CSA, Secretary, Office of
 Business Services (1/5/00)
Jacquelyn R. Bolman, Exempt, Director,
 Scientific Knowledge for Indian Learning and
 Leadership (2/1/00)
Shawna M. Bowker, CSA, Child Care Worker,
 Little Miner's Club House (3/15/00)
Carolyn Brich, CSA, Secretary, Surbeck
 Student Center (1/3/00)
Cherie Hashisaki-Hintz, Exempt, Director of
 Administrative Services, Office of Business and
 Administration (2/1/00)
Dr. Gregory B. Howard, Faculty, Assistant
 Professor, Department of Social Sciences
 (1/1/00)
Jeff A. Jensen, CSA, Fabrication Technician,
 Department of Civil and Environmental
 Engineering (2/7/00)
David W. Martin, Emergency hire, Exempt,
 Acting Director, Office of Financial Aid,

(1/10/00)
Laurie Pope, CSA, Secretary, Department of
 Mathematics and Computer Science (3/1/00)
Laurel Shannon, CSA, Secretary, Department
 of Electrical and Computer Engineering
 (1/3/00)
Tiffany Smith, Exempt, Publications Manager,
 Office of University and Public Relations
 (3/20/00)
Darren M. Soucy, Faculty, Exempt, Assistant
 Professor/Head Football Coach, Department
 of Interdisciplinary Sciences (1/24/00)
Tom Warner, Exempt, Research Scientist
 II/Pilot, Institute of Atmospheric Sciences
 (3/16/00)
FAREWELL:
Linda Brown, CSA, Secretary, Office of
 Business Services (12/30/99)
Michelle Dean, CSA, Little Miner's Club
 House (2/3/00)
Rand Feind, Exempt, Institute of
 Atmospheric Sciences (1/31/00)
Ronald Johnson, Exempt, Institute of
 Atmospheric Sciences (1/31/00)

Tara Martin, CSA, Little Miner's Clubhouse
 (2/23/00)
John Morgan, CSA, Department of Civil and
 Environmental Engineering (1/31/00)
Dr. Timour Paltashev, Faculty, Assistant
 Professor, Department of Electrical and
 Computer Engineering (12/31/99)
Debra Richards, CSA, Department of
 Mathematics and Computer Science (2/16/00)
Ronald J. Richards, Faculty, Athletics,
 Assistant Professor/Head Football Coach,
 Department of Interdisciplinary Sciences
 (12/31/99)
Kristi Wishard, CSA, Office of University and
 Public Relations (2/23/00)
RECLASSIFIED:
V.J. Hedrick, CSA, ITS, has been reclassified to
 a Computer Support Associate retroeffective to
 October 1, 1999
Bradley K. Johnson, has been appointed
 Director of Development by the SDSM&T
 Foundation



Tech Trivia

Did you know...

Tech Trivia

· Did you know that Astronaut Frank Borman (right) received his first honorary degree from SDSM&T? Also pictured is President Harvey Fraser (left). (archives photo)



· The campus of SD Tech began with a small 10-acres and grew to include 118! (aerial overview)



· The 1903 Mines football team was crowned champions of the Black Hills. (Alumni photo)



· In 1961 the Board of Regents approved expenditures for computers at SDSM&T. An IBM 1620 was purchased and installed in the McLaury Building.

3,000 copies of this publication were printed @ a cost of \$1.50 each (printing costs only).

7:40 a.m. Rush Hour



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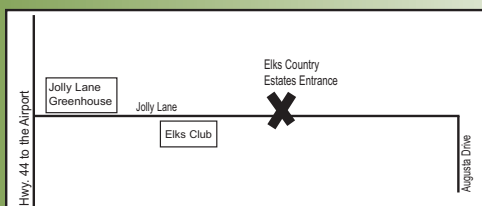
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