

NEW FRONTIERS

NU Scientists Pioneer New Frontiers in Biology, Nanotechnology

A tiny device that could detect hidden nuclear weapons. An understanding of the delicate balance that keeps cells alive. Learning how plant proteins help crops adapt to drought stress. High-density computer storage with 100 times current capacity in less space.

These are some of the breakthrough discoveries being made by scientists at the University of Nebraska, where pioneering researchers push the edge of scientific frontiers each day, solving problems that affect our lives and our economy.

Top quality research is expensive, but it is a prime engine in Nebraska's economic development and is critical to maintaining a strong, vital university.

NU increasingly funds its research-intensive programs by successfully competing for federal grants. In the fiscal year ending June 2002, scientists at the University of Nebraska-Lincoln



Ruma Banerjee, Ph.D., Director, Redox Biology Center, Willa Cather Professor & Professor of Biochemistry, Institute of Agriculture & Natural Resources, University of Nebraska-Lincoln

received \$74.4 million in total research funding—an 18.3 percent increase over the previous fiscal year—and UNL is on track to exceed that record this year. In just two weeks this fall, UNL scientists won more than \$20 million in federal funding to support research centers in nanotechnology, redox biology and plant genomics.

At the University of Nebraska Medical Center, the news is equally promising. Competitive funding increased to \$50.8 million in 2002, a 23 percent increase. The ability to obtain this level of competitive funding has far-reaching implications—not only for the caliber of research that is conducted, but for the caliber of faculty it allows the university to attract and keep.

UNL's new Materials Research Science and Engineering Center, directed by physicist David Sellmyer and funded by a prestigious \$5.4 million grant from the National Science Foundation, is contributing to breakthrough technologies with applications in information technology and advanced electronics. One such invention is a highly sensitive, hand-held neutron detection device, developed by a team of UNL physicists and engineers, that could be used to find hidden nuclear materials, monitor nuclear weapons storage and other national security applications. Five patents are held by UNL or are pending on the processes for producing the semi-conductors as well as on the device itself.

Scientists in the field of redox biology study how cells live and die. Oxidation is a natural process through which living cells harvest energy, but it can produce toxic by-products. Reduction-oxidation (or redox) reactions reduce the damage oxidation causes. A recent \$10 million grant from the National Institutes of Health established the Nebraska Center for Redox Biology to fund work in this frontier of science. Biochemist Ruma Banerjee, director of the center, along with researchers from UNL and UNMC, will study how cells maintain a reduction-oxidation balance and its link to complex diseases such as cancer, cardiovascular disease, Alzheimer's disease and cataracts.

UNL also is the lead institution on a \$6 million National Science Foundation grant to establish a Plant Genome Center to study key enzymes in rice. Because rice is the first cereal crop whose genome has been completely sequenced, it serves as a model for other important cereal crops, such as corn, wheat and sorghum. Director Michael Fromm will lead the center's work on protein kinases—enzymes that help plants react to their environment—which could lead to increased tolerance to drought and disease.

Elite research centers like these grow from the state's investment in university faculty, staff and facilities, and the return on this investment is great. Jobs are created as new technologies and new expertise help existing businesses grow or generate start-up companies. Research programs provide learning opportunities for undergraduate and graduate students. And advanced research increases the stature of the university and the state.



David Sellmyer, Ph.D.
George Holmes Distinguished Professor of Physics & Astronomy, Director, Center for Materials Research & Analysis, University of Nebraska-Lincoln



The magnetic nanocontact chip, too small to be seen here, is used to create materials for highly advanced electronics.



Michael Fromm, Ph.D.
Professor of Agronomy and Horticulture, Institute of Agriculture & Natural Resources, University of Nebraska-Lincoln

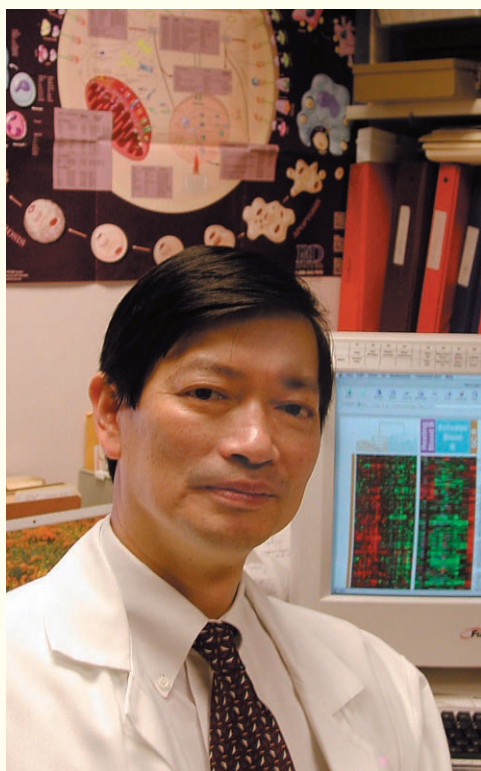


Rice seedlings that will provide the genetic material for the research of UNL's Plant Genome Center.

NEW FRONTIERS

Genes Hold the Clues to Disease

Researchers use DNA microarray technology to study a number of diseases in humans, plants and animals.



John Chan, M.D., Professor of Microbiology and Pathology, University of Nebraska Medical Center

In the race to understand living organisms, a major goal has been to sequence or map genomes—the entire genetic blueprint of specific plants, animals and humans. As genome maps for a species become more complete, a far more complex, and ultimately more useful, task begins—understanding how genes are expressed as traits or predispositions.

University of Nebraska scientists are pioneers in the field of functional genomics. Using sophisticated laboratory and computer tools known as DNA microarray technology, scientists can look at thousands of

genes simultaneously, and assess what they see.

At the University of Nebraska Medical Center, scientists using DNA analysis learned that the most common form of non-Hodgkin's lymphoma is actually two different diseases. They found two distinct patterns of gene expression in diffuse large B-cell lymphomas, signifying there are two subtypes of this cancer with major biological differences. This information may help doctors predict the outcome of the disease in different patients and prompt more aggressive treatment depending on which type of cancer has afflicted these patients.

Each year about 25,000 Americans are diagnosed with diffuse large B-cell lymphoma. And its rate of occurrence is increasing, making it a growing public health concern. Understanding the molecular profiles of cancers can help doctors design new therapies to attack the disease. John Chan leads the research at UNMC, which is collaborating with five other institutions in this study funded by the National Institutes of Health.

Scientists at the University of Nebraska-Lincoln are using this same DNA microarray technology to study a number of diseases in humans, plants and animals.

Andrew Benson, Ph.D., a food microbiologist, is using DNA microarray technology to discover differences in the populations of the potentially deadly bacterium *E.coli* O157:H7, information that could lead to simpler, more sensitive tests to identify infected cattle in feedlots.

Using genetically unique strains of mice developed at UNL, animal geneticist Daniel Pomp, Ph.D., is mapping the many genes that combine to dictate metabolism levels and the predisposition for obesity. An understanding of these genes and how they are expressed can lead to



UNK Takes Classroom to the Shores of the Platte River

Twelve university scholars pursuing majors as diverse as biology, English, economics and political science came together this summer to study one thing—the Platte River.

The University of Nebraska at Kearney campus, which puts a strong emphasis on undergraduate research, paired students with faculty mentors as part of the multidisciplinary study. Funding was provided by the National Conference on Undergraduate Research and the Lancy Foundation, national organizations that make funds available to universities who involve promising undergraduates in research. UNK was one of only two institutions to receive the grant in 2002.

Students did original research on topics such as cataloging exotic species along the Platte, testing the river for iron concentration, researching the water supply and underlying aquifers, and the impact of the Platte on family farms.

John Falconer, director of the Office of Sponsored Programs at UNK and project coordinator, said the summer project was good for the students and the university.

"These students are very involved in their discipline and this was a chance for them to

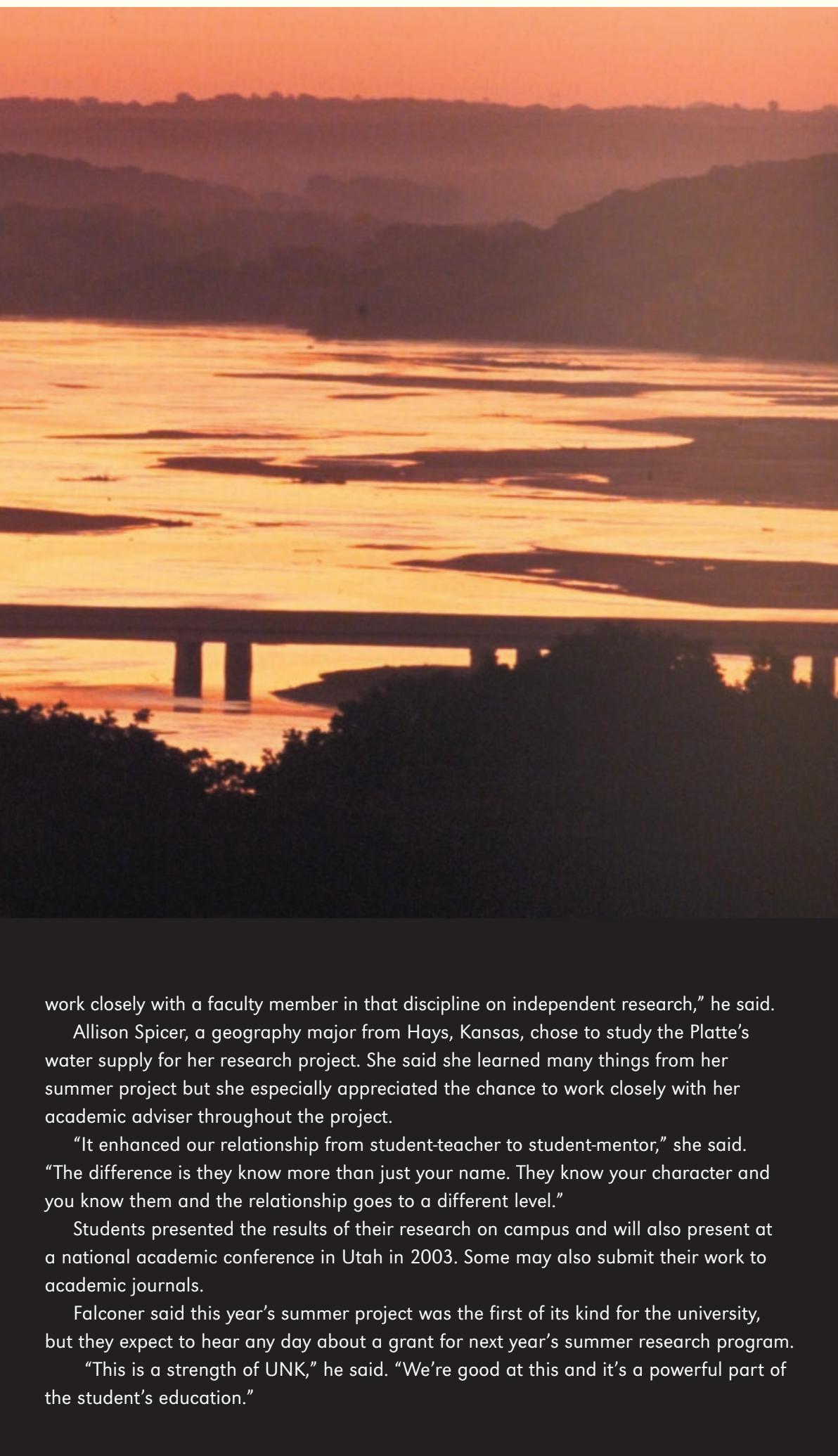
greater knowledge of human obesity and potential treatments for the diabetes, cancer, heart disease and arthritis it promotes.

NU research is expanding our knowledge of the complex world of genomics and its role in diseases of humans, animals and plants.

Nebraska ETV Receives NEH Grant to Produce Willa Cather Biography

The Nebraska ETV Network will produce a biography of Nebraska writer Willa Cather for broadcast on the PBS series "American Masters," thanks to a \$500,000 grant recently announced by the National Endowment for the Humanities. NETV Executive Producers Joel Geyer and Christine Lesiak developed the proposal and script and will co-produce the biography, Willa Cather: Beyond the Frontier. Earlier grants from the Willa Cather Pioneer Memorial and Educational Foundation and the University of Nebraska Foundation supported the development of the project. Shot on high-definition video, this documentary will explore the life and work of one of America's greatest writers.

NEW FRONTIERS



Helping Teens, Children with Difficult Issues

The University of Nebraska makes a huge impact on Nebraska families by educating generations of their children. But it affects them in other ways, too—such as helping them with serious issues like teen depression, teen runaways and at-risk kids.

Researchers at the University of Nebraska Medical Center are part of the nation's largest federally funded study in child and adolescent psychiatry to determine what the best long-term treatment is for teens with depression. Chris Kratochvil, M.D., is the principal investigator of the study at Nebraska, which includes nearly 100 Nebraska teenagers.

"This will provide answers to very important questions about the treatment of teens with depression, a common disorder which we know little about how to optimally treat," he said. "UNMC's research is helping to significantly progress the field."

On the UNL campus, researchers Les Whitbeck, Ph.D., and Dan Hoyt, Ph.D., are studying runaways. Whitbeck, the lead investigator for an eight-city study, has made high-risk kids his life's work. He said that through his work he has learned that runaways in Lincoln and Omaha face the same problems as runaways in New York.

"You have the same risk in terms of predators," he said.

Whitbeck's study will establish hard numbers about the extent of the problem as well as examine root causes. Whitbeck said intervention and treatment would be the next logical step for his research.

At UNO, a project to team mentors with Latino 3rd and 4th graders in Omaha was one of 28 programs selected out of 534 for a Department of Justice grant. The goal was for a mentor to spend at least one hour a week doing academic mentoring with

his or her student, but many mentors have gone far beyond the minimum, according to program director Theresa Barron-McKeagney, Ph.D. Mentors spend time not only providing academic help but taking children to the zoo, parks and on picnics.

"Mentors are spending four hours a week with their student and saying they want to do more," she said.

Barron-McKeagney said she named the mentoring program the Aguante Project, which is Spanish for "preserve."

"When a matador is facing a bull, he has to be persistent and stand firm," she said. "I want to show these children how to stand fearless in the face of danger. You have to prepare them to take whatever comes their way."

NU President L. Dennis Smith personally expressed his support for the Aguante Project and other university outreach programs when he addressed a Latino gathering in Omaha recently. He also shared his own experience working at a packing plant in Indiana.

"This is a guy who knows what this community is going through," Barron-McKeagney said, noting that the crowd gave Smith a standing ovation after he spoke.

Representatives for the Department of Justice recently gave the program high marks for its approach to the entire family—not only is academic mentoring provided for the child, but information on community resources is provided to the whole family.

"They told us we should be the national model," Barron-McKeagney said.

work closely with a faculty member in that discipline on independent research," he said.

Allison Spicer, a geography major from Hays, Kansas, chose to study the Platte's water supply for her research project. She said she learned many things from her summer project but she especially appreciated the chance to work closely with her academic adviser throughout the project.

"It enhanced our relationship from student-teacher to student-mentor," she said. "The difference is they know more than just your name. They know your character and you know them and the relationship goes to a different level."

Students presented the results of their research on campus and will also present at a national academic conference in Utah in 2003. Some may also submit their work to academic journals.

Falconer said this year's summer project was the first of its kind for the university, but they expect to hear any day about a grant for next year's summer research program.

"This is a strength of UNK," he said. "We're good at this and it's a powerful part of the student's education."

UNO Program Offers Leaders New Decision-Making Tools



Jerry Wagner, Ph.D., Founder, International Academy for Advanced Decision Support, Peter Kiewit Institute, College of Information Science & Technology, University of Nebraska at Omaha

The ability to make tough decisions is a precious commodity in today's business world. And Jerry Wagner has been blazing new trails at the University of

Nebraska at Omaha in the area of business decision-making.

Wagner founded the International Academy for Advanced Decision Support at the Peter Kiewit Institute, which enables business leaders to use software to help visualize the future and make better decisions.

The academy is a collaborative hub for the world's leading authorities in the field of decision support systems. It has developed software tools that help business leaders analyze different courses of action and predict the results of them.

Wagner is a former business executive who sold the world's 10th-largest software company prior to joining the faculty of the Peter Kiewit Institute.



Les Whitbeck (right), principal investigator of UNL's study on teen runaways, with co-investigator **Dan Hoyt** (left), director of UNL's Bureau of Sociological Research.

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NEW FRONTIERS

NU ServSafe Program Sets Standard in Food Safety Training

Americans eat out a lot—more than half their meals, in fact.



Julie Albrecht, Ph.D., demonstrates proper food handling techniques for Nebraska restaurant managers.

With so many meals eaten away from home, it's important for public safety and for business that food service handlers stay current on practices to prevent food-borne illness.

ServSafe training is conducted by the University of Nebraska Cooperative Extension in cooperation with the Nebraska Restaurant Association and Hospitality Education Foundation. ServSafe is the industry standard in food safety training for schools, hospitals, institutions and catering services, as well as restaurants, said Julie Albrecht, NU Institute of Agriculture and Natural Resources extension food safety specialist and ServSafe coordinator. Statewide, 24 extension educators have trained more than 6,000 food service managers, each of whom take the information back to about 15 employees, she said.

The 16-hour ServSafe program emphasizes proper cooking temperatures, cooling techniques and effective hand-washing—three major ways to prevent food-borne illness—as well as sanitation procedures, proper thawing and more.

“The course provides managers with more information to understand why the food regulations are what they are,” Albrecht said.

Added Mark Lutz, the restaurant association's executive director, “The ServSafe program includes everything that the food service staff needs to know, from the minute they open the door in the morning to when they close at night.”

A shortened ServSafe employee program is available for preparation cooks, head cooks, short-order cooks, host staff and wait staff.

Tips for Keeping Food Safe

Holiday time is food time. Keeping food safe means protecting your family and holiday guests from harmful bacteria that can cause food-borne illness. These simple—yet very important—food-safety guidelines are from Albrecht and www.fightbac.org.

- Thoroughly wash hands with soap and water for 20 seconds before and after handling raw products.
- Refrigerate or freeze perishables within two hours of serving, and avoid leaving perishable foods out for more

than two hours at room temperature.

- Use plastic or other non-porous cutting boards, keeping one for meats and one for vegetables. Wash with soap and hot water after each use.
- The average kitchen sponge harbors 7.2 billion bacteria that thrive on bits of food that may exist. Use paper towels or freshly cleaned sponges or cloths, and soap and hot water to clean food preparation areas.
- Never place cooked food on a plate that previously held raw meat, poultry or seafood.
- When microwaving, make sure there are no cold spots in food where bacteria can survive. Cover, stir and rotate food for even cooking.
- Defrost or marinate food in the refrigerator, not at room temperature. If thawing foods in water, place in air-tight packaging and change water every 30 minutes. Use food immediately after thawing in the microwave.
- Divide large amounts of leftovers into shallow containers.
- Avoid over-stuffing the refrigerator; cold air must circulate to keep food fresh.

Protecting Consumers With Food Allergies

Quick, accurate tests developed by NU food scientists are helping protect people with food allergies. Food processors can use these tests in their plants to detect even minute traces of allergenic foods in processed foods or on



The UNL-developed test kit.

equipment. Egg, peanut and milk tests have been commercialized; others are in the works. NU is a national leader in studying food allergies from the food industry's perspective.

It's Chicken Soup Time

Every cold and flu season, the “chicken soup calls” start coming to the University of Nebraska.

The calls began in 1993 after Stephen Rennard, a University of Nebraska

Medical Center physician, decided to test his wife's family recipe and supermarket versions of chicken soup to see if it might have anti-inflammatory effects on a cold. Researchers did not identify an exact ingredient that made the soup effective, but theorized it was a combination of ingredients that produced beneficial effects. The public and the news media have been calling ever since for the story and the recipe, found at:

www.unmc.edu/publicaffairs/chickensoup

GALLUP AND UNL – PARTNERING TO IMPROVE RESEARCH-DRIVEN LEADERSHIP PERFORMANCE

Gallup is proud to partner with the University of Nebraska–Lincoln to offer three powerful research programs – the Survey Research and Methodology (SRAM) program, a Ph.D. track in leadership, and an MBA/MA in executive leadership.

The SRAM program offers both master of science and Ph.D. degrees. It is designed to provide state-of-the-art training in research methodology and to develop skills for professional communication and application of findings. Graduates of this interdisciplinary program can expect to find research positions in media, government, business, and the nonprofit sector.

For more information about this program, contact Dr. Allan McCutcheon at 402-458-2035.

UNL's College of Business Administration now offers a Ph.D. specialization in leadership and will be launching the Gallup Leadership Institute in conjunction with this program. The vision for this institute and program is to study and advance the practice of leadership among individuals, teams, organizations, and communities. Ph.D. candidates in this program can expect to study leadership models and methods that create best practices in leadership assessment, development, and performance.

For more information about this program, contact Dr. Bruce Avolio at 402-472-6380.

In January 2003, Gallup and UNL will begin another partnership by offering MBA and master of arts degrees with specialization in executive leadership. The goal for these programs is to develop authentic leaders who can make a positive and sustainable difference in their organizations and communities.

For more information, contact Brian Hittlet at 800-288-8592.

TOGETHER, GALLUP AND UNL ARE BUILDING A BETTER WORLD THROUGH RESEARCH AND DISCOVERY.

THE GALLUP ORGANIZATION