Harnessing the Sun Efficiently

Also in this issue:
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"The advancement of new information is the key to a progressive, successful society—and we are seeing wonders!"

UNK Faculty Researchers Cross Disciplines, Create Scholarly Campus Environment

Many of the advances that have made our lives more stable, productive, and enjoyable originated in university research. Each of us has the desire to become better, to move forward—and active investigation, understanding, and applying new information are the elements of that advancement. Public universities exist not only to teach, but also to engage and be of benefit to the citizens they serve. It is the mission and duty of universities to look farthest into the future and prepare us for the challenges and opportunities ahead.

On behalf of the University of Nebraska at Kearney, I am proud to present this inaugural issue of New Frontiers. It is a sampling of the collaborative research and creative work being conducted by our faculty. Included, for example, is a feature on work aimed at overcoming the economic and technical barriers that currently keep solar energy from being financially viable. Think of the impact success could bring. Helping farmers maintain their hearing in a dangerously noisy environment is the objective of another project. Another explores how simply walking can have profound benefits to our health. Yet another faculty member chronicles the earliest years of our state by researching pioneers whose lives did not make the first draft of history. These lives, only a few generations behind us, help us understand who we are and why we are here. The eight faculty researchers featured in this magazine only begin to tell the story of scholarship at UNK. Great is the personal and professional fulfillment that comes from the hands-on process of experimentation, discovery, and confirmation. Great is the confidence our students build as they work side-by-side with faculty mentors.

The advancement of new information is the key to a progressive, successful society—and we are seeing wonders! Through discovery, commitment, enhanced teaching, and scholarly activity, our faculty are crossing disciplines in their search for knowledge and understanding. All of us at UNK are pleased to share with you our endeavors to "look farthest into the future and prepare us for the challenges and opportunities ahead.”
Not long ago, long-term U.S. energy challenges were masked by low cost gasoline and electricity. When pump prices hit $3.50 per gallon and electricity costs increased, attention focused in earnest on long-term sustainable, environmentally friendly and politically viable alternatives.

For decades, researchers sought ways to replace fossil fuels with wind, nuclear power and hydroelectric power. Each was never as efficient and cost-effective as coal and petroleum. Each alternative had some fundamental obstacle that kept it from wide spread use.

Solar energy, for example, has always been more expensive to produce than coal-powered electricity. Scientists produced energy from sunlight for years, but the technology couldn’t compete in the marketplace—solar panels were just not efficient enough.

Chris Exstrom and Scott Darveau, two Ph.D. chemists at the University of Nebraska at Kearney, have been working on a novel approach with colleagues at the University of Nebraska-Lincoln to make solar energy market viable. Their approach is to create a solar cell film that is up to 60 percent more efficient than the current state-of-the-art.

A Collaborative Nebraska Effort

The project started in 1997 when Drs. Exstrom and Darveau received a call from UNL electrical engineers Rod Soukup and Natale Ianno, experts in producing thin-film materials. The engineers had just devised a new method of producing thin films on solar cells using a hollow-cathode plasma jet deposition system. They needed help with the molecular structure and property analysis of the materials in the areas of light absorption, thickness and infrared absorption properties.

Could Drs. Exstrom and Darveau assist with this next step? They welcomed the opportunity.

The overall goal of the trans-Nebraska team was to boost the electrical output of solar cells so that they could convert about 15 percent of radiant energy received to electrical energy at a cost of $1.50 to $2.00 per watt.

In order to reach these energy and cost targets, single cell performance must be at least 20 percent, if not higher, than current solar cells.

Worldwide research indicated that the best way to do this is through solar cells that are very thin—thin materials have a better chance at absorbing and converting a greater percentage of light to electrical energy than thicker materials. Thin films also promised to reduce material costs as they could more easily be deposited on an inexpensive, durable substrate material such as glass or even on flexible substrates such as mylar.

Harnessing the Power of the Sun Efficiently

A Number of Possible Materials

Since previous research with materials that were comparatively easy to use provided no breakthroughs, the Nebraska team knew they had to begin work with the hard stuff. The UNL-UNK partnership is, in fact, unique because it is experimenting with thin films that other labs are not using because of the difficulty in working with certain elements.

Boron, for example, is promising. Its use increased the bandwidth of light that the film can capture. It also has an extremely high melting point at more than 4,000 degrees.

This thought brought the team to the next step—the UNL researchers prepared thin films of copper, indium and boron that are layered or mixed together. The UNK researchers then added selenium by a method called physical vapor deposition in an apparatus that was custom-built by Dr. Darveau. The resulting material is then analyzed in the UNK lab using Raman Spectroscopy, and the UNL lab with Auger spectroscopy (to determine the elemental content), x-ray diffraction spectroscopy (to determine type of crystalline structure), and scanning electron microscopy (for visual images of the material).

The electrical and photovoltaic properties of each are studied at UNL while chemical structure analysis is conducted at UNK. The team is now turning its attention to developing new films in the copper indium diselenide family that have potential certain materials combined with the film on solar cells may dramatically enhance this energy source's market viability.
to exceed current records in energy conversion efficiency and voltage generation.

How much more efficient are the new materials proving to be? The best thin film, copper-indium-gallium-diselenide, has an energy conversion efficiency of 19.6 percent. The new film must be at least 35 percent more efficient at converting sunlight to energy to be competitive in the market.

The films being developed by UNL-UNK team may reach 25 percent efficiency, which would represent a major leap forward in the renewable energy field.

Additionally, using boron raises the maximum voltage that the film can generate—a critical factor if solar power will ever be efficient to generate hydrogen fuel.

In fact, that voltage and level of efficiency could be high enough to power hydrogen fuel cells, which are on the horizon for new automobile technology. The new approach may also improve the efficiency of solar cell arrays used to generate electricity where access to the power grid is not possible, such as satellites and remote locations.

The University of Nebraska researchers have received over $1 million from the Department of Energy and the Nebraska Research Initiative to continue their work. They are now in the process of refining the recipe for the film, and are looking for support that will pave the way to commercializing the technology as soon as possible.

Harnessing the Power of the Sun Efficiently

A Classroom Opportunity

At many universities, cutting edge research is the exclusive purview of Ph.D.s and their doctoral and post-doctoral students. At UNK, undergraduate chemistry students have had opportunities to work in the project and handle high level assignments.

Students working on the solar cell project have gained experience in UV-vis, infrared and Raman spectroscopy as well as spectroscopic ellipsometry. The concept of students being involved in research is not new in the chemistry department. In fact, several students in the chemistry department have been employed to work in projects other than the solar cell project. The goal is to give the students a chance to apply what they learn in class and develop impressive laboratory skills.

Over the past decade, scientific commissions and academic publications have called for changes to undergraduate education. Lecture based education where students have minimal interaction with faculty created an environment where students were not developing important skills such as critical thinking.

In an article entitled "Undergraduate Research: Needed More Today Than Ever Before," John Mateja, president of the Council on Undergraduate Research and the chair of the American Physical Society's Committee on Education, pointed out that the U.S. has one of the strongest systems of graduate education sitting atop a troubled system of undergraduate education. By engaging students in learning through independent scholarly activities, we would enable students to take control of their education, apply their skills in unpredictable environments, and become the innovators, critical thinkers, and problem solvers this nation will require.

The UNK Chemistry department embraced this thinking several years ago by adopting a graduate school model for undergraduate education. Faculty members each have research groups, where students participate in faculty projects and work on their own related research. This approach forms communities of scholars who challenge and support each other, learn from each other, and develop skills necessary for success in graduate school and professional life.

Dr. Sri Seshadri

Dr. Sri Seshadri has published several journal articles, most of which follow his research interests in marketing. His latest, "The Influence of Purchasing Strategies on Performance: Some Empirical Evidence," was published in the Journal of Business Industrial Marketing, and he also has articles featured in Business Communication Quarterly, Journal of Marketing Management and the Journal of Marketing for Higher Education.

About the effects of his internship on his professional career, Dr. Seshadri remarked, "With it I am able to bring scholarship, faculty development and teaching all into one."

Dr. Seshadri has no plans to slow down. He was a large part of bringing the Mid-Plains Management Conference to Kearney, a conference that has both faculty and student tracks. And of course, he has other research projects he wants to pursue.

A Classroom Opportunity

Crossing Disciplines

Following Research Threads Through Business Ethics, Satisfaction With Athletic Trainers, and E-Marketing

If the mark of a good researcher is following research results anywhere that the data leads, consider one University of Nebraska at Kearney professor a master at pursuing the truth.

Dr. Sri Seshadri, a professor in the UNK Marketing and Management Department, has research interests that reflect a scholar's thirst for knowledge and has found evidence in seemingly unlikely places.

"I like to learn a lot about many different areas," he remarked. "Unlike many faculty who have a very clear research program, I tend to go across disciplines.

Where does this take him? Into areas such as business ethics, satisfaction with athletic trainers, e-marketing, e-commerce and e-communications.

Dr. Seshadri uses his wide-ranging interests to bring other faculty into research, acting as a mentor to faculty members who may not have experience as independent researchers. This models a broader view of research, which helps faculty early in their careers. Dr. Seshadri's wide-ranging interests make him a better professor, having more to offer students in the classroom and in mentoring student research projects. In 2005, he received the Faculty Mentoring Award for the College of Business and Technology at Student Research Day.

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In 2005, Dr. Seshadri served a one-year faculty internship with Intellicom, a central Nebraska company that provides outsourced technology solutions. In the first faculty internship of this kind in the College of Business and Technology, Dr. Seshadri worked on research questions concerning the feasibility of a virtual community mall.

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Dr. Sri Seshadri in his UNK office.

Dr. Sri Seshadri
Reclaiming the Lives of Forgotten Women of the American West

Celebrating The Uncommon Woman

Researcher Dr. Susanne George Bloomfield has a story to tell. To be more precise, three stories. Dr. Bloomfield is not only Distinguished Martin Professor of English at the University of Nebraska at Kearney, but an outstanding historical biographer, penning three books about women writers who lived in the late 1800s and early 1900s.

"I like to set the women and their writings in the context of the social, political, and economic culture of the region," Dr. Bloomfield remarked. Focusing on once prominent women at the turn of the century, she has analyzed and written biographies of Elinore Pruitt Stewart, Kate Cleary, and Elia Peattie, all stories that exemplify the struggles and successes of women during the settlement period of the frontier.

Rural and Urban Pioneers

Dr. Bloomfield’s biographies show the rich—if sometimes difficult lives—that these women lived. Elinore Pruitt, born at Fort Smith, Arkansas, in 1876, spent her childhood in the Indian Territory, teaching herself to read and write with the help of the owner of a local general store. When Elinore was eighteen, both her parents died, and she assumed the task of raising five of her eight younger siblings, working as a laundress for the railroad. A marriage ended, presumably in divorce although she told everyone she was a widow, and she took her daughter Jerrine to Denver where she worked as a housekeeper for an elderly lady. Determined to better her life by homesteading, in 1909 Elinore answered an ad for a housekeeper placed by Clyde Stewart at his isolated ranch in Burnt Fork, Wyoming. Six weeks later she married the 41-year-old widower. Elinore wrote regular letters to Mrs. Coney, her former employer, who was impressed with the stories and arranged for them to be serialized in The Atlantic Monthly. They later appeared in two books, Letters of a Woman Homesteader (1914) illustrated by N.C. Wyeth and Letters on an Elk Hunt (1915). Her books are still in print, and the 1983 movie Heartland, which won national and international awards, was based on her life.

Dr. Bloomfield’s research on Stewart led her to the discovery of other women writers who were also pioneers, each in her own way. Kate Cleary and Elia Peattie, both from Chicago, moved to Nebraska in the 1880s, and each stayed about 10 years. "These two women are significant in the exploration of the lives of what I term 'urban pioneers,' those women not living in sod houses on the desolate plains but still involved in the birth and growth of villages and cities during the settlement period of the West," Bloomfield said.

Kate Cleary and her husband, a lumberman, helped build the village of Hubbell, Nebraska. Kate, called one of the region’s leading humorists by the Chicago Chronicle, published sketches, stories, and poems realistically capturing everyday life in the fledgling community. Many of her writings are amusing, light-heartedly satirizing social conventions and the foibles of human nature; others, however, depict the heartbreakingly harsh life of her neighbors.

From East to the Struggling West

Kate’s married life began like many other Victorian women transplanted from eastern cities to the isolated towns on the plains, devoting her life to her children and husband. However, she lost two of her six children and almost died herself. While battling childbirth fever, her country doctor addicted her to morphine,
a typical treatment of the time. She spent her life fighting to overcome it during an era when ineffective cures were basically to be survived. Throughout it all, she continued to care for her family and kept writing.

Ironically, Dr. Bloomfield's research uncovered the fact that Ella Peattie, her next subject, had been a close friend of Kate Cleary. Elia, who was the first woman reporter for the Chicago Tribune, moved to Omaha with her husband. There she and her husband were both employed by the World-Herald where Elia became the first woman to have a regular column and bylined editorials. Elia, however, was no common journalist; her legacy exists in her literary as well as in her personal and political contributions to society.

Peattie's writings depict not only the transformation of Omaha in the 1890s toward the progressive, just society that she envisioned but also reflect the passion of a woman convinced of each individual's ability to effect positive, lasting change within society. In artistically crafted prose, she challenged her readers to look within themselves to question their beliefs and then act upon them with passion and commitment. She expected nothing less of herself or of her readers; she expected everyone to rise to the level of uncommonness.

Dr. Bloomfield began her research for each biography by traveling across the United States from Philadelphia to Selah, Washington, and from Chicago to Burnt Fork, Wyoming, to interview surviving family members, who shared private documents with her, and to visit the places these women called home. She continued collecting material by visiting the archives of various state and county historical societies in Nebraska, Oklahoma, Wyoming, California, Missouri, and Illinois and speaking with local historians. "Most of my research involved primary materials," she said, "including miles and miles of microfilm of historic newspapers."

"My writing has enriched my teaching of writing in the areas of literary criticism and creative nonfiction," Dr. Bloomfield said. "In my classrooms, my students learn the process of gathering materials from both primary and secondary sources, interpreting this information and organizing it into a coherent and unified text just as I research and compile a book."

Giving Voice to Silences

Silences by Tillie Olson initiated Dr. Bloomfield's interest in reclaiming women's lives. "Reacquainting today's readers with writers from the past who were once well-known and well-respected but have been forgotten during the last 100 years has become a quest for me," Dr. Bloomfield remarked. "Not only are these nineteenth century women's works memorable and important as literary and historical documents, but their lives are inspiring, too, and they can serve as models for us in contemporary society."

"Biographies are an excellent way to enlarge the ever-growing understanding of Western history at the turn of the nineteenth century, not only of the pioneer experience but also of women's literary history," Bloomfield said.

When the stories of these women are told, it gives new perspectives on contemporary America. As the old saying goes, you can't know where you are going unless you know where you have been, and Dr. Bloomfield is working diligently to solve that problem.
Teaching and Scholarship in Harmony at UNK

Academic Studies Bolster Creative and Effective Teaching

For Dr. Valerie Cisler, her professional career has never been about making a choice between teaching and research. “To me, it’s all one. It’s all related. It’s the same goal,” said the professor and chair of the Department of Music and Performing Arts, University of Nebraska at Kearney. “Whether it’s in the classroom or developing materials, it’s all about helping people become better musicians and teachers,” she said. “The things I do in scholarship come from a desire to enhance my teaching.”

And her teaching was recognized with one of the most prestigious university-wide awards presented to faculty—the Outstanding Teaching and Instructional Creativity Award. This award is presented each year in honor and recognition of meritorious and sustained records of excellence in teaching and creativity related to teaching to two full-time faculty members of the University of Nebraska.

Scholarship Enhances Teaching

“I have tried to concentrate my efforts on two main areas of scholarship and creative activity,” Dr. Cisler said. “First, my performance and research on musical composition and interpretation that is directly linked to my desire to be an effective teacher.” Her works on the life and music of Pulitzer Prize nominee Robert Muczynski were selected for inclusion in the Center for American History at the University of Texas at Austin. “Second, my research in the area of publication of pedagogical books and workshop presentations.” Music pedagogy, Dr. Cisler points out, is not a static area of study but a dynamic, and ever changing, art and science. Her online piano pedagogy courses are believed to be the first offered in the country.

A ‘Real Life’ Approach

In his nomination letter for Dr. Cisler, Dr. William Jurma, dean of the UNK College of Fine Arts and Humanities, wrote: “Her record and the accomplishments of her students are consistent and superior. In addition, her scholarship complements her teaching. “She has an agenda as a teacher/scholar that has focus and depth. Her students are motivated, accomplished and recognized for the quality of their work,” he said.

One of her former students, Angela Leising, who is currently an affiliate piano faculty member at Athens (Ohio) Community Music School, said of her mentor, “During my years at UNK, I was a student in many classes taught by Dr. Cisler, including several that she personally developed. Her teaching was one of the most important and valuable components in my training.”

“Classes with Dr. Cisler required a ‘real-life’ approach with hands-on experiences in the field of teaching through demonstrations, internship experiences and observation opportunities. As a teacher and mentor, she continues to inspire my own teaching.”

“Whether it’s in the classroom or developing materials, it’s all about helping people become better musicians and teachers.”

Dr. Cisler’s service record includes work related to her teaching,” Dean Jurma said. “She was instrumental in the
establishment of a Music Pedagogy Resource Center at UNK.

"Her efforts to improve the pedagogy resource center ensured that the students had access to the best examples of teaching materials and resources available," Leising added. Leising now holds an M.M. degree in piano performance and pedagogy from Ohio University and has recently been named a finalist for the national MTNA Studio Fellowship Award.

A Role Model for Students

Dr. Cisler shares her research interests with her students to serve as a role model.

"Through my example, I want students to understand that successful teaching is not limited to the simple acquisition and transmission of knowledge, but expands to a richer, ever-evolving devotion to discovery and shared learning experiences," she said.

UNK music students also get a taste of practical research through experiential learning. Each semester, the college students teach children's piano classes. Class content is developed and taught by UNK students under Dr. Cisler's supervision and includes theory, technique, repertoire, functional skills, and creative activities in improvisation and composition. All sessions are videotaped for self-evaluation and class discussion.

"Student research is a vital component of the piano pedagogy program at UNK," she said. "Creative projects with practical teaching application are interspersed throughout the curriculum. Students have the opportunity to perform and present their assignments on a regular basis with student and faculty feedback. Opportunities for specialized research assignments are administered through independent study projects."

Dr. Cisler's students have been active participants at the annual UNK Student Research Day. Three were selected to present at the National Conference on Undergraduate Research. Several students received scholarship funding for participation and research at workshops and festivals, including the American-Russian Piano Institute, St. Petersburg. Three students had articles published in the national journal, the American Music Teacher.

Writing International Music Books

Dr. Cisler's ability to adapt to the needs of her students is partly based on her research that provides fresh perspectives and ideas. She co-authored Technique for the Advancing Pianist with world-renowned piano pedagogue Maurice Hinson. Her pedagogical books have had international sales of more than 50,000. Her Composition Book series, available through Alfred Publishing, earned her a nomination for the Francis Clark Pedagogy National Award. The books are published and distributed internationally, including Australia, Canada, Malaysia, Singapore, United Kingdom, and the U.S.; the first four were recently translated into Korean. International sales of her pedagogical books have reached more than 50,000.

Her professional recognitions in and out of the classroom are numerous. She is a Fellow with the Center for Great Plains Studies, received the Mortar Board Award for Dedication to Teaching Excellence, was selected for the Nebraska Touring Artist Program by the Nebraska Arts Council, and received the Pratt-Heins Faculty Award for Scholarship, and is a charter member of the UNK chapter of Phi Kappa Phi honor society. As former student Leising said, "Dr. Cisler's tireless work continues to shape her students, the music department and UNK for the better."

Dr. Valerie Cisler

Scales, Chords, Arpeggios and Research CONTINUED

Saving a Student From Giving Up Music

A former student of Dr. Cisler's, Angela (Suing) Wright, was the first UNK student to complete the Piano Pedagogy program, which Dr. Cisler developed.

"In 1999, I not only graduated with a B.A. in music education, I was also the first student to complete the Piano Pedagogy program," Wright said. "The program developed my knowledge in teaching piano and has helped me become a qualified piano teacher."

Earlier in her career, Wright almost gave up playing the piano.

"I had developed a technique in playing piano that was incorrect and had caused serious problems with my wrists and forearms," she said. "The hours spent practicing were causing the numbness and pain. Discove ring this was devastating to me, as I did not want to give up playing piano or my dream of teaching music," she said. In the fall of 1995, Wright began studying piano with Dr. Cisler.

"She worked with me in great depth on 're-learning' how to play the piano. She had me work on a large number of technique exercises. Some of these exercises were from various technique books. Others were exercises written by Dr. Cisler, many of which are now published in Technique for the Advancing Pianist," she said. "Through it all, Dr. Cisler was always positive and reassuring that I would work through this and be able to play more difficult pieces better than I could before."

In November of 1998, Wright successfully performed a Senior Piano Recital consisting of six major works by composers from Bach to Muczynski.

"To this day, when I play piano, I do not experience any of the problems I had during my freshman year in college," she said. "I credit this to Dr. Cisler and her patience and wisdom in teaching me how to play with correct piano technique."
An Epidemic of Hearing Loss

Understanding Why Rural Nebraskans Suffer From So Many Hearing Problems

From a distance, a tractor working a wide prairie field is a bucolic scene of country life. Closer, inside the vehicle's cab, is something else—a deafening whirl of machinery and engine noises.

When Dr. Kenya Taylor, dean of graduate studies and research at the University of Nebraska at Kearney and a specialist in audiology, came to Nebraska ten years ago from Dallas, she made an alarming discovery: Nebraskans have staggeringly higher levels of hearing loss than the individuals she had tested in Texas.

While about 10-12 percent of the U.S. population have some sort of hearing difficulties, 78 percent of Nebraska's agricultural population have a measurably reduced capacity to hear. And this noise-induced hearing loss knows no age discrimination. It affects not just the older male farmers working extensively with equipment, but their families. Teenagers are not immune, and signs of hearing loss even appear in children as young as age seven.

It didn’t take Dr. Taylor long to determine the reason for high incidence of hearing loss: agriculture machine- and animal-related noise. Dr. Taylor has been studying this unique aspect of hearing loss and its preventability ever since.

A Problem Preventable

Since coming to Nebraska, Dr. Taylor has made part of her life’s work the mission of informing rural Nebraskans about the threat to their hearing and giving them tools to slow the damage. Because the mechanism of fine hairs that allow humans to discern sound waves as recognizable data is so delicate, any damage is generally irreversible. The only effective treatment, Dr. Taylor says, is preventing the damage in the first place.

To get the word out and to conduct in-field research, each year she attends agricultural events like the Husker Harvest Days to conduct hearing tests, and spread the word of the slow, painless, but devastating problem. And she hands out earplugs to anyone who will take them.

Since coming to the University of Nebraska, Dr. Taylor has tested about 2900 people, with 1,500 of them having their hearing measured more than three times. Of this group, about two hundred use ear protection regularly—an excellent base to test the results of such hearing conservation techniques.

Why farmers and their families? Dr. Taylor points out that farming is the only major job category with no federal requirements for hearing protection. Other workers in high noise professions, miners and airline workers, have strictly regulated procedures for preventing hearing loss.

"Only nine percent of people working in agriculture use hearing protection routinely. They know it, but don't protect themselves. It is a matter of education. You may not be able to change the old-timer, but you might be able to get him to protect his children or grand children." — Dr. Kenya Taylor

And it’s not just machinery. Sounds from animals, especially in enclosed buildings, often can reach hazardous levels.

Adding to this is the progression of long-term hearing loss. Exposure to damaging noise is painless and can take years. No symptoms are noticed until the individual experiences an inability to fully comprehend speech. Other problems that can occur include tinnitus (a ringing in the ear) and an intolerance to loud sounds. Also, while the hearing loss victim may hear at reasonably normal audio levels, the capacity to discern words or to follow rapid speech may be diminished. Individuals who lose their hearing entirely are condemned to a more solitary life, unable to participate in the full range of human communication.

Some sufferers can be helped through hearing aids, aural rehabilitation, speech reading and other assistive listening devices like cochlear implants.

Hearing loss can also affect a person’s balance. A person who has trouble hearing is at a competitive disadvantage in the workplace. There are still other dangers. Farmers who had difficulty hearing normal conversation were shown to be 80 percent more likely to suffer an injury related to a fall on the farm, according to another study. Wearing a hearing aid was shown to have the highest correlation to work-related injury. Hearing aid-wearers were 2.4 times as likely to be injured on the job, and they were 5.4 times more likely to suffer an animal-related injury, like falling off a horse, and 4.4 times more likely to suffer a machinery-related injury.

A 2005 federal study found that hearing-impaired farmers are eight times more likely to suffer a fatal occupational injury than the average American worker and twice as likely to suffer a non-fatal occupational injury.

Field Research in the Field

Dr. Taylor’s mobile unit is equipped with a complete audiometric test booth and equipment. The van was purchased in 2000 by the Nebraska Safety Center. The UNK Speech-Language-Hearing Clinic provided the sound-proof booth and the audiometric equipment. Additional grants through the Safety Center allowed the team to upgrade the computer and software for the van.

"The software allowed us to track individual tests," she said. "For example, if I tested you today and printed out the test, the software would be able to follow your progress over time."
would pull up and print every test that had ever been done on you. The importance of this is that we are able to track your hearing loss as it progressed, or monitor the efficiency of ear protection devices."

Dr. Taylor's research is important as there is not a lot of scientific data available on hearing loss in agricultural populations.

"Unfortunately, the severity of noise-induced hearing loss increases with age and years of experience. It may begin with kids who ride on tractors. Many do not take the problem seriously. They laugh about it and accept that they will have significant hearing loss."

— DR. KENYA TAYLOR

The most effective method of hearing protection is through use of earmuffs, headphones or custom made protectors. But that's not always an easy sell. Many agricultural workers do not like to use ear protection. They claim it is dangerous not to be able to hear. Such protection is also considered hot and uncomfortable. Luckily, noise protection earplugs and headphones are coming on the market that allow any sound up to 85dB to pass through, but block any sound louder than 85dB. "This type of protection allows the person to hear what's going on around them, but protects them from noise louder than is safe," Dr. Taylor said.

A Rock Band Model

Since federal regulations today prevent most workplace noise threats, one of the few high noise areas where participants can legally achieve hearing protection are music concerts. Such events are virtual auditory research laboratories in studying noise-related hearing loss.

Dr. Taylor is currently studying threshold shift, the degree to which hearing is muffled after exposure to loud noises for a prolonged period, by testing concert goers who have listened to a live rock band for a half hour, an hour, and hour and a half and two hours.

Noise levels in rock and roll bars, Dr. Taylor found, can reach 125 dB, the threshold of pain and roughly equivalent to the highest farm noise levels, particularly inside closed tractor cabs. Generally, 85 dB is considered the limit of "safe" noise. Like the farm results, the data was shocking with significant short-term hearing impairment and discernable long-term problems.

The rock and roll study is an intriguing one to Dr. Taylor. With her initial studies, the research can go any direction she wants, including testing the effects of alcohol on temporary threshold shifts and on permanent hearing loss.

Dr. Taylor's research into agricultural threats that are hazardous to hearing is currently under review for publication in a professional journal.

More than one hundred students have participated in Dr. Taylor's research program over the past ten years. These students have hands-on experience administering hearing tests, evaluating the collected data and presenting the results. It is an opportunity for them to help Dr. Taylor spread the word that even seemingly bucolic scenes can mask a silent enemy."
walking toward the wellness campus

Student Obesity May Have a Simple Solution

Old black and white movies about collegiate life show trim and healthy students, books in hand, strolling on tree-shaded pathways. Today’s images reveal something different—not-so-slim drivers competing for parking places next to their lecture halls.

One University of Nebraska at Kearney researcher is using the university and community as a research model to promote increased physical activity among students. These studies are showing that relatively modest and common sense approaches and ideas can promote increased exercise.

If Kate Heelan, an associate professor in the Department of Health, Physical Education, Recreation and Leisure Studies, has her way, UNK will become—and become known as—“The Wellness Campus.” And her dream may yet turn into reality, given the frenetic pace of her scholarly campaign to obliterate obesity by encouraging—and, yes, even forcing—campus inhabitants to walk.

From her office in the Human Performance Laboratory wing of the Cushing Coliseum at UNK, Dr. Heelan not only teaches and mentors dozens of undergraduate and graduate students, but orchestrates a steady flow of externally-funded programs and research activities, all designed to prevent excessive weight gain, increase physical activity and enhance wellness.

It All Starts With a Plan

How do you get people to move instead of ride or sit? Have a plan, and make it fun and interesting, too.

For example, hundreds of children in Kearney are now walking to school as a part of a Dr. Heelan-organized “Walking School Bus to Increase Physical Activity,” an innovative and ambitious program funded by the American Heart Association. Here, volunteer UNK students pick up kids like a choo-choo train and walk them to school.

Hundreds more youngsters participated in the third annual “Nebraska Kids Fitness and Nutrition Day,” also a Dr. Heelan-designed-and-organized event at UNK, this one funded by the Nebraska Beef Council. In September 2006, nearly 600 fourth-graders from Buffalo County came to the UNK campus to join in an event that promoted physical activity and proper nutrition habits.

The day saw these school children, 70 teachers and parents, and 140 UNK volunteers — students, faculty and staff — enjoying 15 “physical activity stations” on Foster (football) Field including an obstacle course, step aerobics, parachutes, fitness balls, “down-the-tubes,” and many more enticing games.

Six nutrition education stations in Cushing Coliseum balanced the strenuous physical exercise on the field. Dr. Heelan and the Nebraska Beef Council also provided funding to five other communities in greater Nebraska to host the same event.

Not Just the Latest TV Fad!

For Dr. Heelan, this is not just following the latest TV-guru-generated exercise and

Besides being fun and improving the health and well-being of the participants, these projects are designed to better understand, through the scientific method, how the body performs, how to motivate participation, and actually why regular exercise, even simple exercise like walking, leads to better health.
diet fad. Her projects and programs, besides being fun and improving the health and well-being of the participants, are all designed to better understand, through the scientific method, how the body performs, how to motivate participation, and actually why regular exercise, even simple exercise like walking, leads to better health.

"Getting people to understand that physical activity and exercise are different is very difficult," said Dr. Heelan. "We need to change the mind-set of adults today that exercise should not be a punishment, but should be enjoyed. Getting daily physical activities like going for a walk, gardening, bike riding with children, these physical activities can be very enjoyable, less intimidating and still provide health benefits."

Dr. Heelan is worried as researchers have stated that the current generation of adults may die before their parents due to the obesity problem which primarily stems from lack of exercise.

Everything in society nowadays, she noted, is built for the automobile, with limited walking access in many places to parks and recreation areas. "The number one predictor of physical activity in children is time outside," she says. "If kids can't walk to school or walk a park because of traffic and infrastructure, they choose sedentary behaviors."

Campuses, above all places, she says, should embrace concepts of "New Urbanism," a national movement that calls for a thoughtfully designed and aesthetically beautiful live-work-play community where cars become an afterthought, largely unnecessary.

On campuses, she says, everyone insists on parking next to the building where they take classes, work or teach. "Why not push parking lots further away," she says. "Why not hide the elevators in buildings, and instead build big, beautiful staircases that are welcoming, places you want to be instead of wanting to avoid."
It is a Duty to Understand the Role History Plays In Our Increasingly Interdependent and Changing World

With oceans separating it from Europe and Asia, the United States once could remain indifferent to world activities. A dependency on foreign oil, an expanding global marketplace and rapid transportation advances have thrust the U.S. into areas of the world both familiar and unfamiliar to its citizens.

Watching this transition and trying to communicate the lessons of history are historians like Pradeep Barua, professor of history at the University of Nebraska at Kearney.

"To keep ourselves informed about our history is not an onerous task, it is a duty, which is patently obvious to us in the context of today's world," says Dr. Barua.

Recent events in the Balkans and in the Middle East underscore that present-day problems have roots from long ago. As competition for resources increases, ancient prejudices may increasingly influence the ongoing evolution of nation-states and involve other nations, if not the entire world.

For example, India and Pakistan have nuclear weapons technology, and are engaged in a long-standing border dispute that periodically flares into very tense situations. Is this a potential site for a major war, or are there stabilizing factors that could be cultivated, Dr. Barua asks?

Dr. Barua lives by the famous admonition of Spanish historian George Santayana who warned us more than 100 years ago that "those who cannot remember the past are condemned to repeat it."

A Diversity of Knowledge and Experience

Dr. Barua is a prominent scholar of south Asian military history. In 2003, he published Gentlemen of the Raj: The Indian Army Officer Corps, 1817-1949, which chronicled the transformation of a small colonial force in India led by the British to a national army.

The story is unique, as it centers on the only post-colonial officer corps in a developing nation never to have toppled a civilian administration. Such stable internal political mechanisms affect how nations respond to crises, and the Indian history bodes well for the region.

India is known as the world's largest democracy and despite its social and cultural complexities the nation is an important element in an otherwise unstable area of the globe.

India is known as the world's largest democracy and despite its social and cultural complexities the nation is an important element in an otherwise unstable area of the globe. Understanding the nature of ethnic conflict, particularly within military organizations, is essential for the North American observer to see beneath the headlines from troubled parts of the world.

As Dr. Barua explained, it is the duty of citizens in a democracy to understand the world around them. UNK aims to produce graduates who are prepared for responsible citizenship, and knowing the history of our nation as well as the history of other nations is part of that preparation.

A Global Shift

Prominent in Dr. Barua's UNK office is a large map of Asia. The placement is no accident as this area of the world will become the world's economic nexus in the next 50 years. By 2050, the bulk of global growth will occur along a line from Mumbai, India to Shanghai, Dr. Barua said. It is an onerous task, which is patently obvious to us in the context of today's world, he argues that there are no cultural norms in fighting wars States will use resources and strategies that best fit their situations.

Dr. Barua's work extends into other regions as well. In 1990, he published an article in Armed Forces & Society entitled "Ethnic Conflict in the Military of Developing Nations: A Comparative of India and Nigeria."

Max Weber's definition of a state included the notion that governments hold a monopoly on the legitimate use of violence, but cases abound where territories experience violence from multiple factions that are viewed as legitimate by different parts of the society. Understanding the nature of ethnic conflict, particularly within military organizations, is essential for the North American observer to see beneath the headlines from troubled parts of the world.

In 2005, Dr. Barua published The State at War in South Asia, which is an analysis of military effectiveness in southern Asia for the past three thousand years, from prehistory to the current nuclear threat.

In the book, Dr. Barua explores nation building in a way that goes beyond the typical comparison of eastern versus western history. He presents an analysis of military strategy in southern Asia that challenges common notions that the western way of war is superior. In fact, he argues that there are no cultural norms in fighting wars States will use resources and strategies that best fit their situations.

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Food, Wealth and War

Marketing Concepts
Learned Though
Childhood, Research
and Travel Abroad

Dr. Tim Burkink's interest in food can be traced to his early days growing up at his family's grocery store in Scriber, Nebraska. Food—specifically consumer behavior concerning food—still drives his research as professor and associate dean of the College of Business and Technology at the University of Nebraska at Kearney. He has studied topics ranging from adolescent nutrition to the marketing of food during the transition to a free market economy in the formerly war-ravaged region of the Balkans. Much of his work has been centered on the importance of food and small business.

When it comes to studying consumer behavior, "there's no better place" than a grocery store," he said, noting that social changes can be seen in people's purchasing habits and what they are eating.

Adolescent Eating Habits

In a current project funded by a $350,000 USDA grant, Dr. Burkink and professors at University of Nebraska-Lincoln are examining adolescent nutrition in the United States. The study observes social and behavioral factors, or drivers, behind adolescent eating habits.

The sample for his study includes surveys completed by Kearney and Lincoln middle and high school students, their parents, and school administrators.

The second part of the study will be directed at the environments adolescents are immersed in to observe how they are targeted by food marketers. Part of this phase will include students using cameras to document their personal eating habits.

Dr. Burkink said the study will compare and contrast results between higher and lower income youths. "The next step is to collect data from different parts of the country," Dr. Burkink said.

Food and War

Moving from teen issues to the effects of war and capitalism, Dr. Burkink's recent publication, "When Policies and Marketing Systems Explode: An Assessment of Food Marketing in the War-Ravaged Balkans and Implications for Recovery, Sustainable Peace and Prosperity," is a study he conducted with colleagues that dealt with the transition of countries in the former Yugoslavia to a free market.

To complete the study, Dr. Burkink made a series of trips to the Balkans over five years, studying food marketing and food systems in the region. His findings were published in the May 2005 issue of the Journal of Public Policy and Marketing.

During the Balkans study, Dr. Burkink said he noticed three important issues in the region, the first being the importance of agriculture and how success in that sector becomes very difficult in a war-ravaged area.

Another point that Dr. Burkink said he became aware of was how quickly the food retailing industry in the region was converting from small, family-owned stores and farmers' markets to larger Western food chains.

"[The transition] changes their way of life, the opportunities of farmers and affects the way consumers do their purchasing," Dr. Burkink said.

Old Enemies, New Markets

The final major point that Dr. Burkink said he recognized during his time in the former Yugoslavia was how the citizens and businesses viewed the differing ethnicities in the area. Dr. Burkink said that while some people may have viewed others as enemies due to earlier civil war, many of the businesses he interviewed in the area saw these same people as new markets and capitalized on the situation.

Not contained to the Balkans, Dr. Burkink is examining the relationship between markets and social conditions in a collaborative project he is working on in conjunction with UNK political science professor Dr. John Anderson.

After researching how a capitalist transition and war affects social change, Dr. Burkink turned to examine the relationship between social capital and out-shopping in rural communities.

Dr. Burkink described social capital as "the level of trust in a community" and the degree of neighborliness that exists in a community. He said so far their research has indicated that communities with higher levels of social capital tend to experience lower rates of out-shopping, or people traveling to other communities to make their purchasing decisions.

In relation to his Yugoslavian study, Dr. Burkink said that the family-owned stores being replaced by larger food chains and out-shopping may cause the social capital of the region to decrease, because larger retailers and out-of-town retailers do not foster the sense of community that exists with smaller, local businesses.

A Relationship Between Trust and Wealth

Dr. Burkink said that the key to building social capital is to stimulate more broad-based community involvement by citizens. He said these networks with more trust create wealthier communities.

"Community leaders need to understand there is this relationship. They need a way to build more involvement in the community to build civic involvement in people," Dr. Burkink said.

"I came from a town that has pretty high social capital," Dr. Burkink said.

Dr. Burkink said his father's business in Scriber taught him the value of social capital. He said his father was deeply involved in the school, church and community, and as a result, people were loyal to his store.

"[My father] never took a class past high school, and he was not a by-the-book businessman, but people liked him and appreciated him, and then shopped at his store," Dr. Burkink said.

Whether the project is studying food-related economics in a free market transition, adolescent obesity or social capital, Dr. Burkink has compiled a number of research projects that all can relate back to one thing: working at a grocery store.
LEARNING BY DISCOVERY

Undergraduate Research at UNK

Danielle Policarpio carefully considers a laser spectroscopy experiment.

The University of Nebraska at Kearney is among a group of higher education institutions where undergraduate research is prominently stressed. Here, students learn their subject material through exploration and discovery.

Such activities enrich the learning experience. Independent research and creative activity allows students to take knowledge and skills learned in the classroom and apply them to novel challenges. Working closely with faculty experts, students can engage in the academic enterprise in a way that develops critical thinking, project management and presentation skills that will be valuable in a lifetime of learning. The National Survey of Student Engagement shows that UNK students report more participation in out-of-class research than many top institutions.

Students are encouraged to participate not just by their instructors, but through institutional funding sources. The Undergraduate Research Council awards grants for student scholarly projects. Working with their mentors, students can request up to $400 for supplies and operating expenses.

The UNK Summer Student Research Program (SSRP), with a $3,000 stipend, supports one-on-one collaboration with faculty experts to design, conduct and present projects. While there are many opportunities at UNK for students to engage in research, the SSRP is unique because it forms a community of scholars each summer who challenge and support each other while learning about research in other disciplines.

Nebraska EPSCoR (Experimental Program To Stimulate Competitive Research) offers $5000 grants to science faculty for research that involves undergraduate students. UNK students also participate in the National Science Foundation’s summer student research programs. These programs, called REU Sites (Research Experiences for Undergraduates), typically focus on an individual academic discipline.

Independent research and creative activity allow students to take knowledge and skills learned in the classroom and apply them to novel challenges. Results of these research projects are shared among students and faculty at such venues as UNK’s Student Research Day, an annual event where students present their scholarly work. There is a poster session with over 250 entries, oral presentations, musical performances and art exhibitions.

UNK students also show their work at the National Conferences on Undergraduate Research, where students from across the country present their scholarly work in an academic forum. UNK typically sends a large delegation of students each year.

The Effects of Culture and Experience on Judgments of Attractiveness
Student Bradley Stastny

Humans form a clear preference for attractive faces during infancy. This research determined if these preferences are set in infancy or modified by experience across a lifetime. To accomplish this, elementary school children from Northern Europe who were being educated at an international school in Spain were sampled. These children’s initial experience was with individuals of their own ethnic background. However, their schooling experience was primarily with those of Spanish descent. The research displayed to the children various prototype photographs of Northern European and Spanish children, all previously rated as equally attractive. Third grade students rated the Spanish children as less attractive than children whose appearance was similar to their own. However, research found that older participants (ninth grade) rated the Spanish children as more attractive. The results suggest that repeated exposure to faces dissimilar to one’s own increases the attractiveness of those faces.

Perception of Depression Among College Students
Student Brindil Ulmerk

This research examined the effects of media commercials as compared to standard health screenings for depression and the likelihood for individuals to self-diagnose. It was hypothesized that individuals shown medication advertisements would be more likely to self-diagnose depression than those who took a standard health screening or participated in neutral conditions.

Redistricting Nebraska Legislature Using GIS
Student Ryan Raack

Following the 2010 Census, the Nebraska unicameral districts will be redrawn. Similar to the 2000 redistricting, Nebraska’s 49 legislative districts will need adjustment for an increase in overall population and the continued shift eastward. In addition, there are the other legal mandates of compact districts that are contiguous in nature. Augmenting these legal parameters is the overarching objective in redistricting to preserve communities of interest (COIs)—neighborhoods with shared economic or cultural characteristics. With the advent of GIS software and the personal computer, literally thousands of iterations can be performed in the time it used to take to draw one plan manually.

Preparations for Winter Storms in Kearney, Nebraska
Student Michael Blakely

This research focused on the preparation and procedures that dealt with the two ice storms in December 2006 by various agencies within or near Kearney, Nebraska. Areas of investigation were: how did the news agencies inform the citizens about how to be prepared for the storm? How did Kearney’s Mayor and other city officials inform the citizens about how to be prepared for the storm? How did Kearney’s Mayor and other city officials deal with the black outs throughout the area to conserve electrical power as the lines feeding Kearney were being repaired? The ice storms left Kearney and some thirty counties without electrical power. This study was an in-depth look at the preparedness and procedures of Kearney and associated agencies as the storms approached. Then it analyzed how the city of Kearney dealt with clean-up of broken trees and how NPPD dealt with the huge task of restoring power.

A Sample of Undergraduate Student Research Projects
At a Glance
THE UNIVERSITY OF NEBRASKA AT KEARNEY

Students
- 5,381 undergraduate students and 1,064 graduate students.
- Students come to UNK from all 93 Nebraska counties, 45 states, and 46 foreign countries.

Faculty
- 309 full-time and 68 part-time faculty.
- 99% of full-time faculty teach undergraduate courses, generating 91% of the credit hours at UNK.
- More than 90% of full-time faculty have the highest degrees in their fields.

Housing
- Eight traditional-style residence halls, two suite-style residence halls, two Greek chapter house complexes, one university apartment complex.
- All residential units are within easy walking distance of the academic buildings, the library, the student union, and the Health and Sports Center.

History
- Founded in 1905 as Nebraska State Normal School at Kearney.
- Became Nebraska State Teachers College in 1921.
- Renamed Kearney State College in 1963.
- Joined the University system as the University of Nebraska at Kearney, in 1991.

Student/faculty ratio: 17 to 1
Average class size: less than 25

Academics
- UNK offers 170 undergraduate majors, 28 pre-professional programs, and 34 graduate programs.
- Each year, the UNK Honors Program accepts more than 100 freshmen based on ACT scores, letters of reference, class rank, and essays. At present, there are 325 students in the Honors Program.
- UNK's undergraduate research program is a national model. More UNK students have participated in the annual National Conference on Undergraduate Research (NCUR) than any other college or university in Nebraska for the past five years. UNK sends one of the largest groups in the nation to NCUR each year.
- UNK is the only campus in Nebraska to participate in the National Student Exchange (NSE) that allows students to attend one of 180 other universities or colleges across the continent for a semester or a year, often at UNK tuition rates.
- Outstanding freshman-to-sophomore retention rate of over 80%.

The U.S. News and World Report's 2007 Best Colleges edition included UNK in its list of the Top 15 Public Universities in the Midwest Region at the Master's Level.

Careers
- Many UNK programs have a job placement rate of almost 100%, including Graphic Arts, Industrial Technology, Speech and Hearing Disorders, Accounting, Education, and Computer Science and Information Technology.
- Graduates of UNK's College of Education account for 33% of all Nebraska high school principals and 35% of all public school superintendents appointed in Nebraska every year.
- Many UNK graduates become administrative leaders in both the public and private sectors of the state and the nation. Others go on to successfully apply to medical, law, and other professional and graduate schools across the country.

Athletics
- 2007 and 2008 host to National Division II sports championships in wrestling and Elite 8 women's basketball.
- Programs include baseball, softball, football, volleyball, wrestling, women's swimming, men's and women's cross country, men's and women's basketball, men's and women's tennis, men's and women's golf, and men's and women's track and field.
- UNK has won the RMAC All-Sports Trophy every single year that it has been a member of the RMAC.
- UNK athletes are students first. The average cumulative GPA for all 16 Loper teams is consistently above 3.0, and the UNK women's basketball team recently posted an average cumulative GPA of 3.723—the highest of all other NCAA, NAIA, and junior college programs in the nation. Similarly, the 2003-2004 wrestling team had a 3.519 GPA, the highest average in the history of the award.
- UNK athletic events have repeatedly set new national attendance records. For example, an average of more than 1,000 people enjoy UNK home volleyball matches, tops in the NCAA Division II, and UNK holds the national attendance record for a single match.

Nickname: Lopers (for the Pronghorn Antelope)
Colors: Blue and Gold

Value
- Among the most affordable universities in the region, UNK is an excellent investment in your future. Annual costs range from approximately $11,000 for Nebraska students to approximately $15,000 for out-of-state students.
- More than two-thirds of all UNK students receive some form of financial aid.

Campus and Student Life
- More than 160 student organizations, including four sororities and six fraternities.
- A beautiful, technology-rich, 513-acre residential campus with more than 43 buildings, located in Kearney, Nebraska. The campus offers students easy access to the city's vibrant cultural life, outdoor recreational facilities, shopping centers, award-winning restaurants, and affordable housing, as well as to all the hockey, indoor football, entertainment and community events hosted at the 610 million Health and Sports Center arena.
- In the last decade, UNK has invested to renovate or expand every academic building and residence hall, the Nebraska Student Union, and Foster Field.
- The Calvin T. Ryan library offers extensive online resources, including a collection of more than 9,000 journals.
- The Speech, Language and Hearing Laboratory on campus, a state-of-the-art clinical and teaching facility, serves more than 1,000 Nebraskans with speech and hearing disabilities every year.
- The Museum of Nebraska Art (MONA) is home to the official visual art collection of the State of Nebraska.
- The UNK campus is also a Nebraska Statewide Arboretum site.

More than 90% of UNK classrooms are "smart classrooms" that include advanced multimedia learning tools.
More UNK students have participated in the annual National Conference on Undergraduate Research (NCUR) than any other college or university in Nebraska for the past five years. More students from UNK attend the NCUR every year than from almost any other university in the nation.