Herman Melville and the Arts
Reading the River
Rats, Cereal and Alzheimer’s
It is with great pride that we launch this NKU publication, paying tribute to the outstanding research taking place at NKU. The eight researchers featured here are emblematic of hundreds of people on our campus who are engaged in cutting-edge research.

There are so many wonderful things I could say about research conducted at NKU, but I'd like to focus my comments on four aspects that I find particularly noteworthy. First, our faculty members excel at the integration of their research with their teaching and public engagement responsibilities. Second, the diversity of research being pursued on our campus is most impressive. You will read about laboratory research, field research, archival research, community-based research, and creative work, to name a few. Third is student involvement in research. Our faculty recognize the tremendous advantage that accrues to students who engage in research with faculty mentors. While student involvement in research often slows the progress of the research, our faculty look for opportunities to involve their students. Fourth is our faculty’s success in procuring highly competitive research grants. Congratulations to those featured in this publication and all faculty who have received external funding to support their work.

Finally, I would like to highly commend Dr. Salina Shrofel for her outstanding work on this publication.

Welcome to DISCOVER, the first edition of Northern Kentucky University’s annual research magazine. Designed to portray the depth and breadth of research and scholarship at NKU, each edition will include articles about scholarship in the humanities, social sciences, professions and the sciences.

NKU, as both a regional comprehensive and a metropolitan university, is committed to regional stewardship, applying the university’s intellectual resources to support regional economic, educational and social progress. One way to measure a university’s impact is its scholarly output: the research and creative work of faculty and students. This first edition provides a glimpse of the research programs active on the NKU campus. It features the work of eight faculty from English, education, psychology, biology, art, informatics, archaeology, and business, and of graduate and undergraduate students. Each of the research stories is unique, but taken together they show the university’s commitment to creating cultural, scientific, social and economic benefits for the region.

I hope that you enjoy and learn from DISCOVER 2008 and will pass your copy on to others after you have read it.
04  A WHALE OF AN ADVENTURE
REVEALING NEW INSIGHTS ABOUT
HERMAN MELVILLE

07  OUT OF THE CLASSROOM,
INTO THE LICKING RIVER
USING NATURE TO
IMPROVE TEACHING

10  IF MEMORY SERVES...
HOW RATS AND CEREAL MAY
HELP ALZHEIMER’S PATIENTS

12  GLOBALIZATION NOT JUST
FOR HUMANS
INVASIVE SPECIES’ IMPACT ON
NATIVE PLANTS AND ANIMALS

15  NEW FACULTY BOOKS

16  TAKING CARE OF
BUSINESS MANAGEMENT

18  THE GREENING OF NKU

21  REVEALING THE SHAPE OF
HUMAN PROTEINS

24  UNEARTHING PRE-HISTORIC
LIFE IN SOUTHEAST ASIA

26  STUDENT RESEARCH

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On the Cover: Melville’s copy of The Arch of the Emperor Marcus Aurelius, designed and engraved by G. B. Piranesi in Rome in 1764. Private collection. In his poem “The Age of the Antonines” (1891), Melville declares that the age of Aurelius was “the zenith of time” and the “Solstice of Man.”
A WHALE of an adventure

A dusty bag of engravings in a Massachusetts library took NKU professor Dr. Robert Wallace on an art-filled exploration of one of the most famous fiction writers in American history: *Moby-Dick* author Herman Melville.

Dr. Wallace has documented more than 400 engravings that Melville collected throughout his life. And he’s readying them for publication in a book that will reveal new insight into the writer.
“After no one was reading Melville, he became a customs inspector in New York City. He was writing poetry on the side, and he was collecting these engravings,” Dr. Wallace explained. “So when you put this all together, it shows how active and engaged he was his whole life, instead of just falling off the side of a cliff when people didn’t appreciate him.”

Dr. Wallace, a Department of Literature and Language professor, teaches a course in Melville and the arts. He’s studied the writer’s life and writings for years. But when he came across an 1891 obituary that mentioned Melville collected prints and engravings, it sparked his interest.

“One obit mentioned he owned these prints, but then nothing had been said about what happened to them or where they were. He left no record of them. Through a series of research steps that climaxed at the Houghton Reading Room at Harvard, I discovered where 270 of these prints were,” Dr. Wallace said.

He found them stashed in a paper bag at the Berkshire Athenaeum Public Library in Pittsfield, Mass. “They had been donated by one of his granddaughters, and they had been sitting there for about 30 years. I discovered them in 1984. I guess the reason nobody looked at them was because we have such a separation between the disciplines. He was a writer and this was art,” he said.

But Dr. Wallace, who has written six previous books, saw the engravings as part of the varied and well-traveled life of Melville. It was a new way of looking into his mind and his life. Some of the engravings and artists are mentioned in Melville’s works, he said.

“In the 19th century, only the really wealthy could buy paintings, but middle-class people could buy engravings. So this was a way he could be comprehensive in the way of the Metropolitan Museum but at relatively little expense,” he said.

Many of the engravings, as would be expected, are of maritime scenes. Others are prints of the Holy Land, camels in Persia, landscapes, portraits, and prints of monasteries in England and France. The work spans the 16th through 19th centuries and includes the work of artists Claude Lorrian, J.M.W. Turner, Rembrandt van Rijn, and others.

“It’s quite a wonderful story of archival preservation,” Dr. Wallace said. “It’s really exciting intellectually to find out what all of these meant to him and to connect them to his writing and his traveling and his book writing.”

[Melville] had an encyclopedic interest about the human experience, which shows up in Moby-Dick. You have the whaling story but he goes off on all these tangents, which is like the art he collected,” Dr. Wallace said.

The prints in Massachusetts led him to 170 more. Most of these are in the homes of direct descendants of Melville’s four granddaughters. He traveled to Virginia, Maine, Texas, Connecticut and Massachusetts to interview family members and photograph the engravings for his book. In total, he’s cataloged more than 435 engravings and believes there may be more in other private collections.

“It’s quite a wonderful story of archival preservation,” Dr. Wallace said. “It’s really exciting intellectually to find out what all of these meant to him and to connect them to his writing and his traveling and his book writing.”

Previous page: Dr. Wallace’s photo of 20 engraving after paintings by J.M.W. Turner on the day he first saw them at the Berkshire Athenaeum in Pittsfield, Mass., in 1985. He has since discovered another 14 engravings after Turner from Melville’s collection.
Wallace has carefully documented the engravings through photographs and short written descriptions of the work and any markings Melville made on them.

“I’m organizing the book chronologically and by national schools of painting. That’s how people thought in his time, the Italian and French schools, the Dutch and English, the German and American,” he said. “I’ll discuss what each print may have meant to Melville but also try to suggest how the collection as a whole changed the way he saw the world.”

Dr. Wallace has talked with several publishers and believes his book could be on bookstore shelves in three years. He thinks it could have wider appeal than just among Melville academics.

“I think there is a lot of interest in collecting these days, and in the relations between words and pictures, and in transatlantic cultural exchange,” he said.

A Closer Look

Research director: Dr. Robert Wallace, Professor, Department of Literature and Language

Research subject: Art collection of Moby-Dick author Herman Melville


On the web: http://www.nku.edu/~wallacer
Nearly 100 Kentucky teachers got an up-close look at the Licking River Watershed, studying local environments, cultures, economics, and politics in an innovative program conducted through Northern Kentucky and Morehead State universities.

The award-winning “Reading the River” program spanned five years starting in 2001; each year about 20 teachers participated. The state-funded program aimed to help K–12 teachers better understand their own natural backyards and to use the outdoors to teach students subjects from science to math to social studies.

“Reading the River was based on research that shows that students’ academic performance improves when the natural environment is used to teach a variety of subjects,” said NKU’s Dr. Yvonne Meichtry, a Department of Teacher Education and School Leadership professor.

“Most of the research so far has been about how effective place-based education has been in teaching K–12 students. Research has shown that academic performance improves across school subject areas; discipline [problems] have been reduced; school attendance is increased; and the teachers themselves are more satisfied with their jobs,” Dr. Meichtry said.

“I wanted to develop teacher training programs to help teachers use place-based teaching approaches successfully with their students. I also saw the need for research about the effectiveness of place-based education programs for teachers,” she added.

The goals of Reading the River were to better prepare the teachers to use place-based teaching strategies in their classrooms and to examine whether the
teachers were better prepared to do so, and were actually doing so, as a result of the program.

“I’ve always been an outdoors person and see the importance of incorporating the natural environment and community-based resources in educational programs, as opposed to teaching only within the four walls of a classroom, or watching videos, or being on the Internet,” she said.

Reading the River was an intensive six-day program that followed the 300-mile Licking River through its 19-county watershed from Magoffin County in eastern Kentucky north to where it empties into the Ohio River between Covington and Newport. In that time teachers canoed the river, documented its water quality and macrobenthic life, and talked to residents, experts, and politicians about the river’s impact on community life. They also investigated how land use affects the river.

Among those who spoke to the teachers were representatives from the Daniel Boone National Forest and the Army Corp of Engineers, a local county judge-executive, and farmers. Teachers tested eight to 11 sites along the river to examine the pattern of water quality and sources of pollution.

“The overall goal of the program was to look at how land use affects water quality. We wanted them to understand there are a lot of natural environments that they can have their students study as well as community resources they can use to teach their students,” Dr. Meichtry said.

At the program’s end teachers developed lessons to teach their students what they learned in the program. These lessons addressed the state education standards. The program included two follow-up sessions for teachers to share their classroom lessons and to provide further training.

“Because the program was funded, we gave the teachers classroom resources such as water testing kits, magnifying glasses and dip nets. We gave them from $300 to $1,000 of classroom material depending on the year,” Dr. Meichtry said.

Meichtry’s research found that teachers’ knowledge of the local environment and water quality issues grew, and they easily integrated the experience into lessons within their classroom and in the outdoors. Teachers also found valuable community-based teaching resources (sites and humans) they continued to use in the classroom after the program ended.

Nature Walk – Julie Whitis, teacher at Simon Kenton High School in Kenton County, applies her learning from the Reading the River program to teach her students a lesson on stream ecology.

“Teachers “experience” the Licking River, conducting field studies and making observations along the way in the Reading the River program.

“When we got to the mouth of the river on the very last day … I had one teacher say it had been a spiritual experience. When you’re looking at the mouth you’re thinking about everything you’ve seen and done moving downstream,” she said.
As the director of the Center for Environmental Education at NKU, Dr. Meichtry has expanded the university’s public outreach to area educators and has involved university students.

The NKU center is one of eight at the state’s public universities and is part of the Kentucky University Partnership for Environmental Education. “These centers partner in developing programs and often share grant resources to fund those,” Dr. Meichtry said.

“The functions of the KUPEE centers are to provide teacher and leadership training, coordinate regional services, develop environmental programs and curricula, and conduct environmental education research,” she said.

The center has developed a website for a number of research-oriented programs, including Reading the River and the Aquatic Ecology for Teachers graduate course. The center also co-sponsors NKU’s Earth Day with NKU’s Environmentally Concerned Organization of Students and works with several community agencies to conduct K-12 teacher and student environmental education programs.

“A wide variety of classroom resources and professional development programs are offered for K-12 teachers and students,” she said, adding, “NKU students are provided with service-learning experiences through their involvement in many of the community outreach programs for K-12 students.”

**A CLOSER LOOK**

Ecology – Yvonne leads a group of teachers at Northern Elementary school in a classroom-based ecology lesson. Professional development program sponsored by the Center for Environmental Education.
Rats and cereal could play a key role in improving memory for people with Alzheimer’s disease. A simple food reward test is among those that Dr. Mark Bardgett, NKU Regents Professor of Psychology, is using to better understand how the brain retains memories.

Dr. Bardgett’s research attempts to produce behavioral signs of Alzheimer’s disease in rats. To achieve this goal, he surgically induces damage to the hippocampus, a brain region that helps form new memories. He then studies spatial memory in such animals.

“We food-restricted the animals, then gave them Honey Nut Cheerios. We put them in a maze, and they had to go to the right in the maze to get the Cheerio. Then they had to remember to go to the left the next time to get the Cheerio,” Dr. Bardgett said.

The rats must alternate several times in the T-shaped maze to get the food. Those with damage to the hippocampus have a significantly harder time remembering which way to turn compared to rats with a normal-sized hippocampus. The brain-damaged rats are also more agitated when they’re put into new environments.

“Rats with hippocampus damage alternate in the maze about 50 percent of the time. The normal rats alternate about 90 percent of the time,” he said.

Dr. Bardgett, along with several undergraduate students, is now examining ways to help improve memory function in rats with brain damage. If successful, the treatments could someday lead to more effective therapies for Alzheimer’s disease. This research could also help people with other brain disorders associated with memory problems, such as schizophrenia.

In his research, two commercially available anti-psychotic drugs have shown small but significant promise: clozapine and risperidone. In addition to improving memory, risperidone was also found to reduce agitation in rats with damage to the hippocampus. But the damage and its effects on behavior were not completely reversed.

“What we find is that we improve memory but don’t get things back to normal,” Bardgett said.

“[Antipsychotic drugs] are called ‘dirty drugs.’ That’s because they work with five or six neurotransmitters and receptors in the brain. We’re trying to find out which of those systems the drug interacts with and if there are one or two in particular that are important in memory,” he said.

One particular neurotransmitter that is affected by antipsychotic drugs is histamine. Dr. Bardgett has recently received funding from the National Institutes of Health to determine if drugs that block a specific brain receptor for histamine, called an H3 receptor, can improve memory in
rats with brain damage. These drugs are different from the antihistamines commonly used to treat allergies.

That research, if successful, could lead to drugs that effectively treat Alzheimer’s disease and schizophrenia without the debilitating side effects of antipsychotic drugs. Those side effects can include weight gain, motor skill loss and diabetes.

**Plaque doesn’t just build up on teeth**

In Bardgett’s other Alzheimer’s-related research, he and students are examining mice that have a gene found in humans with the disease. When the mice turn a year old, roughly equivalent to middle age in humans, they begin showing signs of Alzheimer’s disease, both in the brain and through behavioral symptoms.

This gives researchers an opportunity to try various treatments that could reverse the effects of memory loss. One promising area relates to the buildup of plaque in the brain. This buildup occurs when the brain overproduces a peptide called amyloid and is believed to be a possible precursor to Alzheimer’s disease or dementia.

Though in the early stages of research, they also are looking at what could relieve or worsen symptoms in their Alzheimer’s mice. They’re testing if exercise lessens behavioral abnormalities by letting the mice have continuous access to a running wheel in their cage. And mice, like humans, are social creatures, so they’re also examining whether isolating the Alzheimer’s mice from other mice aggravates symptoms.

Another source of future study is the 10 percent of mice who have the Alzheimer’s disease gene but don’t show symptoms of the disease.

“Maybe if we can find out what is making them so hardy we can then say ‘OK, this is what we need to look for in people,’ or ‘There is this thing that mice produce that protects them; make this into a drug,” Bardgett said.

Dr. Bardgett hopes that these latter studies will add to understanding about memory loss. Such knowledge could lead to better treatments for Alzheimer’s disease.

“Ultimately, if I can find out some little things and put those little things together, they can wind up having some meaningful impact,” Dr. Bardgett said.

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**Research director:** Dr. Mark Bardgett, Professor, Department of Psychology

**Research subject:** Alzheimer’s disease, schizophrenia, and memory loss

**Research highlights:** Thirteen peer-reviewed publications and one invited book chapter since joining NKU faculty in 2000 – the last five publications with student co-authors. Thirty-nine scientific conference presentations during the same period, all with students as primary authors or co-authors. Presentations have been made at the International Behavioral Neuroscience Society, International Congress on Schizophrenia Research, Midwestern Psychological Association, Society for Neuroscience, and Winter Conference on Brain Research, among others. Three students mentored by Dr. Bardgett have received competitive undergraduate travel awards from the Faculty for Undergraduate Neuroscience and the International Behavioral Neuroscience Society. Invited member for Minority Biomedical Research Support Review panel at the National Institutes of Health. Invited reviewer for the Alzheimer’s Association Research Grants Program and University of Missouri Research Board Grants Program.

**Funding highlights:** Has brought in more than $1.2 million in external grant funds to NKU since 2002. Acted as principal investigator on following external grants: *Improving memory after hippocampal damage*, Academic Research Enhancement Award, funded by the National Institute of Mental Health 4/1/07-3/31/10, total award amount $196,650. *Lead faculty activities at Northern Kentucky University*, funded by NIH-Idea Networks of Biomedical Research Excellence Program 8/1/04-6/30/09, total award amount $141,932. *Antipsychotic drug action after hippocampal damage*, funded by the NIH-Idea Networks of Biomedical Research Excellence Program 8/1/04-6/30/09, total award amount $822,655. *The effects of risperidone on memory deficits produced by hippocampal damage in rats*, funded by Janssen Pharmaceutical, 1/1/04-12/1/04, total award amount $9,500. *Neurobehavioral effects of magnesium depletion in mice*, funded by NIH-Kentucky Biomedical Research Infrastructure Network 10/1/02-9/30/04, total award amount $95,443.

**On the web:** [http://www.nku.edu/~bardgett/m](http://www.nku.edu/~bardgett/m)
Globalization shows that the world really is becoming a smaller place, but the phenomenon isn’t limited to jobs and the economy. It’s also true in the natural world where foreign, and sometimes invasive, species of plants and animals can have a precarious impact on a particular environment.

That’s why Dr. Richard Durtsche, associate professor in the Department of Biological Sciences, is examining the effect of invasive amur honeysuckle on native wood frogs (Lithobates sylvaticus) in northern Kentucky. But the research has impact outside of the region. This fast-growing Asian honeysuckle spread across the Midwest and the eastern United States after it was introduced into the country in the late 1800s as a decorative plant. This research will also contribute to the worldwide study of invasive species’ impact on the loss of plant and animal species.

“Invasive exotic species are considered to be one of the most important drivers of biodiversity loss across the world. Encroachment from alien species can change habitats and contribute to global amphibian declines,” Dr. Durtsche explained.

Dr. Durtsche and colleague Dr. Richard Boyce, with the help of dedicated undergraduate students, are looking at the environmental impact by studying tadpoles and their growth and development into frogs and their digestive systems. One way they’re doing this is by looking at how the wood frogs develop based on the type of leaves that drop into the water they live in. These leaves, once they fall into ponds and lakes, release the defensive chemicals, or tannins, produced by the plants to ward off plant eaters (herbivores).

The wood frog was chosen because it’s one of the first frogs to breed each spring. Because the chemicals in the water from the fall leaves are at higher concentrations in the spring than later in the year, tadpoles of these frogs are vulnerable to the effects of these chemicals, including problems with their digestion.

In both field and laboratory settings, the tadpoles are raised in water that has different concentrations of “teas” made by mixing water with leaves from either a mixture of native plants or the invasive honeysuckle.

“We raise the tadpoles, feed them and collect fecal material to see how efficiently they have digested their food. We monitor how quickly they grow and how fit they are when they become frogs,” Dr. Durtsche said.

Preliminary results from the “teas” of honeysuckle and native plants showed that the frogs that were exposed to the honeysuckle tea had a shorter jump length and had fewer energy reserves than those exposed to the pure water and native plant tea, among other observations.

“We know the ones that store the most energy are going to do the best,” Dr. Durtsche said.
The research project continues and more study needs to be done, but the research indicates the honeysuckle could weaken the wood frog population.

Another research project looks at how quickly the amur honeysuckle decomposes in water compared to native leaves. The faster the leaves decompose, the higher the concentration of tannins, Durtsche said.

“The honeysuckle is all over the edges of forest, and it’s dropping leaves into the water,” Dr. Durtsche said.

The research consists of placing into ponds and streams near campus six mesh bags of honeysuckle leaves and six mesh bags of sycamore leaves. The leaves are examined every two weeks over three months. Results are still preliminary but show that the honeysuckle deteriorates much faster than the sycamore leaves. That means the honeysuckle leaves potentially are more destructive to tadpoles’ digestive systems.

“By changing water chemistry in ponds and streams, it may reduce the survival rates of developing amphibian larvae, contributing in yet another way to the global decline of amphibians,” he said.

**Studying acid reflux in tadpoles**

Dr. Durtsche, along with his students, is also examining tadpoles’ digestive systems to develop and find ways to alleviate acid reflux in humans. They’re doing this by closely examining their gastric activity and the triggers and controls of acid production in the digestive process.

This research is still in its early stages but so far research has found that there is high acid production in the stomach area of tadpoles. In the process, the researchers are developing an exciting new technology for measuring gastric changes in tadpole stomachs. They’ve developed a small chamber that holds the stomach open and allows for detailed testing and observation with tiny probes.

“**Invasive exotic species are considered to be one of the most important drivers of biodiversity loss across the world.**

Dr. Durtsche in the field in northern Minnesota collecting tadpoles and quantifying aquatic organisms in a woodland pond.
“These technologies allow us to measure acid concentrations in fresh tissue at the cellular level with pH-sensitive micro-electrodes that we have designed and fabricated,” he said.

This allows Dr. Durtsche and his students to inject specific substances including liquids, food, and drugs into stomach tissue while the pH levels are recorded with the micro-electrodes. This shows the exact effect these foods, liquids, and drugs have on increasing or decreasing acid production levels. Potentially, the research could help develop better treatments for acid reflux, sometimes a precursor to deadly digestive diseases.
Archaeology of the Lower Muskogee Creek Indians

Dr. Thomas Foster’s *Archaeology of the Lower Muskogee Creek Indians* takes a first-ever look into the past of the Muskogee Indians who lived along the lower Chattahoochee and Flint rivers in the southeastern United States.

“No one had ever done it before or knew what we knew archaeologically about this particular group of Native Americans, so it needed to be done,” Dr. Foster said.

Combining archaeological excavation with historical documents and modern-day interviews, the NKU anthropology professor discovered a rich diversity among the Muskogee and their unique cities and towns, as well as deep ties between today’s Indians and their past.

“One of the major findings is the Indians aren’t all the same; there is a lot of variation between different towns and a lot of continuance between past Indians and the Indians of today in terms of culture, religion and the way they recognize their kinship,” Dr. Foster said.

The book examines the period between 1715 and 1836. “I want people to understand the importance of preserving archaeological sites and preserving the past,” Dr. Foster said. “If we want to understand where we are now, we have to understand where we have been.”

*Archaeology of the Lower Muskogee Creek Indians* was published in 2007 by University of Alabama Press.

Colonial Chesapeake: New Perspectives

NKU’s Dr. Debra Meyers’ and Salisbury University’s Dr. Melanie Perrault’s *Colonial Chesapeake: New Perspectives* is a collection of scholarly essays and historical documents that detail the role of an often-overlooked region in the development of the United States.

“One of the reasons we put this book together was because colonial American history often focuses on New England, but the Chesapeake can really tell us more about the development of American society, culture, and politics,” Meyers said.

Exploring colonial reproductive politics, multiculturalism, and political power as well as social and cultural norms, the contributors to *Colonial Chesapeake* reveal the complexity of life in early Maryland and Virginia and suggest ways in which modern American society began.

“After reading these well-written essays and primary source documents, we hope undergraduate students will see the importance of understanding colonial America from a southern perspective,” Meyers said.

Dr. Meyers’ essay in the collection, “Reconstructing Gender: Early Modern English Politics and Religion in the Chesapeake,” provides a glimpse into everyday life of common people in Maryland during the 17th and 18th centuries. “Since common people rarely left written evidence behind, reconstructing their lives depends upon more creative investigation using court records, legislation, deeds, tombstones, wills, and other probate materials,” she said.

*Colonial Chesapeake: New Perspectives* was published in 2006 by Lexington Books – a Division of Rowman and Littlefield Publishers.
When managing an organization, are a manager’s motives behind making improvements important? And can those motivations affect the quality of improvements?

Those are questions NKU professor Dr. Matthew Ford is seeking to answer by studying organizations that are evaluating internal processes using the Malcolm Baldrige Criteria for Performance Excellence. If successful, Dr. Ford’s research could lead to better understanding of quality management among business academics and practicing managers.

The Criteria for Performance Excellence is one element of the Baldrige National Quality Award Program administered by the National Institute of Standards and Technology. “[The Malcolm Baldrige Award] was implemented as a way to heighten awareness of quality management in the U.S.,” Dr. Ford said. “It was developed in the late ‘80s in response to concerns we had in the ‘70s and the early ‘80s about global competition in different industries like cars and semiconductors and steel.”

Dr. Ford, a Department of Management professor, based his research on how organizations use the CPE. Updated annually, the CPE represents guidelines for managing key organizational processes such as those related to leadership, customers, and human resources. Although close alignment with the CPE can lead to formal recognition such as a Baldrige Award, the vast majority of organizations use the criteria for other purposes.

Dr. Ford has examined dozens of organizations that have used the CPE for self-assessment to identify gaps between current and desired process performance. He has been particularly interested in factors that motivate managers to engage in self-assessment and in the downstream consequences of self-assessment on performance and other outcomes. Data for the research have been collected in several ways, including interviews with managers, direct observations inside organizations, and examining archival documents and records.

His findings are somewhat controversial, he admitted, because they contradict conventional wisdom that self-assessment is conducted because of rational, internally driven desire to improve.

“Sometimes organizations do it because they feel pressure from a big customer or they get some kind of a heat from an influential outsider. Or maybe it’s because organizations, just like people do, seek legitimacy, so they do things so that they can get kudos from others,” he said. “It’s the dark side of why you do something, not just a rational ‘I want to improve’ motivation.”

This is important in understanding why outcomes might not be as expected when organizations conduct self-assessments, he said.

“Unless you are aware of why you are doing this … then outcomes might not be as positive as you would like,” he said.

Currently, Dr. Ford and a group of colleagues are engaged in a research project focusing on the Ohio Award for Excellence, a state version of the national Baldrige Award.

“We have obtained multiple years of data from applicants to that process, and we are in the process of analyzing that data. We’re initially interested in identifying factors associated with different levels of performance as determined by the OAE evaluation process,” he said.

“The research question is, what factors appear related to high-rated levels of performance? Are there certain factors that tend to be consistent with high-level performers compared to the low-level performers?”

Does financial literacy lead to better decision making?

Dr. Ford is also researching what effect NKU students’ knowledge of the financial world has on their daily decision-making skills.

“My working hypothesis is that if you’re making decisions anywhere in an organization, you’ll make them better if you’re more in tune with what’s going on in financial markets. If you are an accountant, or if you’re in IT or HR, you’ll make better decisions overall if you possess higher levels of market awareness,” he said.

He started by assessing student attitudes toward and understanding of financial markets. He’s done that through a series of questionnaires that assesses market familiarity, comfort level, and interest.
“The first questions involved how students felt about financial markets and how these attitudes related to what they knew about market conditions. A lot of literature suggests if you feel threatened by a subject then you’re not going to do well in learning about it,” Dr. Ford said.

He’s tested more than 250 business school students since 2005, and the results have been clear. “It verified an inverse relationship. The more intimidated students are, the less they know about markets,” Dr. Ford said.

So he’s now looking at whether online media and financial websites can contribute to a less-intimidating and up-to-date way of learning.

“When people take a finance class, they are often asked to read Wall Street Journal, which exposes students to market realities that are difficult to convey in the classroom. But with today’s technology being what it is, a newspaper might not be the best way to learn about current financial market context. There are media out there that are being updated many, many times a day. If you connect to the web, for example, there are a number of sites that offer financial commentary and data in close to real time,” Dr. Ford said.

Now he’s working with New York City-based Minyanville Publishing & Multimedia to investigate the effects of exposure to the company’s financial website, www.minyanville.com, on college student learning about financial markets. The site is updated hundreds of times each day when domestic financial markets are open. Early results suggest a positive relationship between website exposure and student financial market awareness. Findings from this research could offer professors and teachers a new tool for helping students learn about financial markets that, due to their socially complex nature, are difficult to grasp using conventional classroom techniques alone.

“At the Minyanville website, you’ll find a bunch of Wall Street professionals who are trying to make sense of markets each day and sharing what they’re thinking and doing. The learning happens by watching those folks, the experts, do that in real time. Today’s technology permits learners to peer into the minds of experts in action and perhaps, over time, adopt similar patterns of thought. When the goal is to transmit knowledge and skills that are largely tacit and grounded in complex social context, there can be a real value to that,” Dr. Ford said.

Research director: Dr. Matthew Ford, Associate Professor, Department of Management

Research subject: Quality management, financial market awareness and decision making, implementation of organizational change


On the web: http://www.nku.edu/~fordmw
Professor Brad McCombs is an artist who fuses creativity with an environmental and social consciousness in creating large-scale and dramatic artwork that questions traditional thinking.

“I see my role as an artist as looking at the big picture,” said McCombs, assistant professor in NKU’s Department of Visual Arts and Media Informatics.

McCombs’ work includes large installation pieces, sculpture, interactive electronic media, and robotics. Among his most versatile and often-used art materials are straw and wheatgrass. He’s turned straw bales into large, cave-like structures that showcase the stability and durability of the natural building material. Among the places his work has been shown are Hanover College in Indiana, the Urban Institute of Contemporary Arts in Grand Rapids, Mich., Steinberg Gallery in St. Louis, and The Regina Gouger Miller Gallery in Pittsburgh.

“Straw bales are a really good way to make things because they are extremely sustainable. If you build a structure, and down the road it needs to be changed or altered, you can add to it, but it can also just be plowed back into the ground and it will decompose,” McCombs explained.

McCombs is planning his most ambitious project yet for northern Kentucky: a permanent art studio made from straw bales and adobe. The project should take about two years to complete and start this summer, he said. It would be the first building of its kind in the northern Kentucky area.

“It’s challenging how we build structures in our society and how we can build them more efficiently and more economically,” he said.

McCombs is determining a place to build the studio, possibly on NKU’s campus or on private land in northern Kentucky. Among the challenges he’ll tackle is working with a local government agency in gaining a building permit for the innovative structure and determining the most durable, creative, and sustainable way to build it.

McCombs is applying for grants from the NKU Office of Research, Grants and Contracts and the NKU Research Foundation to start the project.

“The structure itself will be an experiment because there are actually different ways you can coat the straw bales so they’ll last. I’ll look at different mixtures of
adobe and actual earth from the ground, mixed with limestone or cement,” he said. “And (I’ll) be jumping through a lot of hoops in order to get something like this approved … because it is more of an alternative building material,” he said.

The studio would have a regular concrete foundation and a wooden or metal frame. Its doors and windows would also be made of more traditional wood and glass. The straw bales would be compressed to keep them strong, and the structure would be covered in various plaster/adobe mixtures.

“I’ll be evaluating the coatings (the adobe) every six months or a year to see what’s most sustainable what’s going to last the longest,” he said.

Many don’t consider straw a good material to build a home or structure with; McCombs plans to contest that thought.

“If you wanted it to last for hundreds of years, it could last for hundreds of years as long as you have a good plaster coating on it,” he said, adding, “The really important thing about straw bales is that their insulation rate is extremely high, two or three times the insulation of a regular house.”

McCombs eventually would like to power the studio and a campus computer lab with wind turbines, a first in Kentucky. He would also capture rainwater from the roof and use it to water plants and other vegetation.

“When you think about the U.S. in terms of how much energy we use in comparison to the rest of the world, I think we really need to question how we structure our society. Part of my role as an artist is to question some of those connections and to try to find solutions and ways to use less waste and to create things using less energy,” he said.

The studio and the wind turbine project could lead to McCombs’ creating data on environmentally friendly building materials and structures.

“How will future generations remember the 21st century? Do we continue to use greenhouse-causing fossil fuels and inefficient building materials to build our structures, or do we incorporate smart technologies and renewable energy sources such as solar and wind and sustainable building materials such as straw, adobe, and rammed earth?” McCombs asked.

It also fits in with NKU’s plans to create a more environmentally sustainable campus.

“When President Votruba has an initiative to help reduce climate emissions at the university, and I thought it could be a really good step for the university and for Kentucky. There are no wind turbines in the state. We could take a leadership role in becoming a green campus and using energy in a smart and intelligent way,” McCombs said.

“The Norse were known for capturing the wind to power their mighty ships. The NKU ‘Norse’ could be known for capturing the power of the wind to become a more sustainable campus,” he added.

Research director: Brad McCombs, Assistant Professor, Department of Visual Arts and Media Informatics

Research subject: Alternative, environmentally sustainable structures and ecological activism

Research highlights: In the planning process to build an art studio made of straw and powering it and a campus computer lab with wind turbines.

On the web: http://www.bradmcco.net
“Sometimes figuring out how the smallest parts of your body work can lead to the biggest advances in medical understanding.”
With that in mind, NKU professor Dr. Kevin Kirby is looking inward, using computer coding to help predict the shape of proteins inside the human body. If successful, his research could lead to quicker progress in studying diseases and developing drug treatments for them.

“A protein is a long chain of amino acids, so it’s like beads on a string. It’s become very routine nowadays if you’re a biologist to put a protein in a machine and have it tell you its sequence of amino acids. It’s just like letters in a word. But that doesn’t tell you what the protein does or what it looks like,” said Kirby, the Evan and Lindsay Stein professor of biocomputing.

Discovering a protein’s shape can lead to medical breakthroughs and a better command of how the body works, he said.

“A lot of drugs do their work by interacting with proteins. So if you know the physical shape of the protein clump in 3D, you know how to design a drug molecule that mates with it and alters the structure of the protein. It’s all about shapes bouncing against shapes,” he said.

Kirby will be working with two undergraduate students this summer to develop a software package based on statistical algorithms he created to further the research. If correct, the algorithm could show the shape of the protein based on its sequence of amino acids.

“It’s a good programming workout for the students. They will have to write a program that goes to an Internet database and downloads the protein sequences, runs them through my own programs, and then displays them in 3D,” he said.

“This is very experimental. It’s based on some of the same algorithms websites use to learn your purchasing habits. It’s about having a computer form and revise its beliefs. Add a little more math and it may work for proteins,” Kirby said.

Taking the “geek factor” out of computer coding

In another project, Dr. Kirby helps takes the “geek factor” out of computer coding in a joint university research project aimed at preserving Belize lobster fishers’ way of life with a program that simulates their fishing environment. “As a computer science teacher you’re always trying to push against that geek mentality that code is just about code instead of about the world we live in,” Dr. Kirby said.

Dr. Kirby is working on a project that examines the Glover’s Reef Marine Reserve led by Dr. Charles Acosta, Department of Biological Sciences professor, in collaboration with Dr. Gail Mackin, Department of Mathematics chair.

In the warm waters of the Caribbean, Glover’s Reef Marine Reserve is a source of commercial lobster fishing that is threatened by overuse.

“A lot of villagers make their livelihood by fishing lobsters. But the lobster population is in danger. So what the government is trying to do is rope off parts of these giant reefs. There is a restricted area for most of the year,” Kirby said.

But an ongoing problem is deciding how much of the reef should be cordoned off and for how long.

“If they rope off too much of their reef, the fisherman can’t make enough money, and the fishing industry dies. If they don’t rope off enough then the lobster population goes away and, again, the fishing industry dies,” Kirby explained. “The idea is to find just the right size and shape.”

That’s where university researchers come in. Dr. Acosta and a group of students have traveled to Belize collecting data related to the environment and life cycles and birth and death rates of the Caribbean spiny lobster.

From there, computer science students have developed code based on mathematical modeling from the collected data that shows how the lobsters will react if various sections of the reef are blocked from fishing for differing parts of the year.
“In the old days you’d have to write equations for that, which would be very abstract, and you would miss a lot of the detail. Now you can write a computer program, which literally can track tens of thousands of simulated lobsters. They live their lives on the reef. They eat; they reproduce; they live; they die. You simulate fishing and weather and seasonal patterns,” Kirby said.

The researchers are still collecting data and haven’t yet found an optimal solution. When they do, they plan to take their research to the Belize government to help set official policy.

It’s not only about lobsters. “Using computer programs to study populations of species is a tradition going back four decades. We’re using a only a few new techniques here, and we hope to apply them to other ecosystems as well. The Planet Earth is a great test bed for code!” Kirby said.
NKU professor Dr. Judy Voelker is among a multi-national group of archeologists nearing the end of a decades-long project to unearth the past in one of the world’s least understood parts of southeast Asia.

As the Thailand Archaeometallurgy Project, a team in 1986 began the excavation of three prehistoric sites in central Thailand: Non Pa Wai, Nil Kham Haeng, and Non Mak La. The team has included researchers from the University of Pennsylvania, Italian Institute for the Middle and Far East, National Parks Service, Washington State University, and Silpakorn University in Bangkok, Thailand.

The sites contain some of Asia’s largest known copper production sites, and researchers there examined ancient production and extraction techniques, daily life, and mortuary practices. This ground-breaking research not only uncovers the past but also reveals insight into how culture and life evolved into what it is today.

“We are trying to look at past lifestyles and that interaction between culture and technology. We’re looking at how people are living in the past, how they are utilizing different materials in trade and exchange, and how people are modifying their environment,” said Dr. Voelker, assistant professor in the Department of Sociology, Anthropology, and Philosophy.

Dr. Voelker joined the project near the end of the excavation phase in 1994, when she spent three months at Non Mak La. She worked alongside local anthropologists and learned the Thai language. She’s now heading the extensive research report on Non Mak La, set to be finished in late 2009.

“It’s really a spectacular site. It has habitation; it had a mortuary component and craft production all located in a modern-day banana field. We were working with locals in a local village,” she said.

She also spent the summers of 1996 and 1997 at the University of Pennsylvania, where she set up a lab at the University Museum of Archaeology and Anthropology that displayed about 20,000 recovered artifacts on loan from the Thai government.

An exciting discovery at Non Mak La was a cemetery. It contained more than 50 graves where men, women, and children were buried. The site predates the country’s Buddhist custom, since the religion’s tradition is to cremate the dead.

“[Burial practices] are a good way to examine social organization, look at diet and nutrition and at pathologies of health,” Voelker said.

Another discovery was the more than 100,000 standardized molds at Non Pa Wai. Researchers believe villagers used these for currency, for trade or for bronze production.

“This summer Dr. Voelker and three NKU students will be traveling to the sites to do some additional research to finish the project.

“We received the grant from the College of Arts and Sciences, and the students will be going to Thailand with me this summer to work on the data sets that were unanalyzed,” she said.
Research director: Dr. Judy Voelker, Assistant Professor, Department of Sociology, Anthropology and Philosophy.

Research subject: Pottery making and distribution in a central Thai village Ban Tha Kok; excavation of three prehistoric sites in central Thailand.


Funding highlights: TAP received grants from the National Geographic Society and the National Science Foundation, University of Pennsylvania Museum of Archaeology and Anthropology funds, and private donations. NKU students working with Voelker have received two SURG (Student Undergraduate Research Grants) to assist with analysis on the project. Voelker received a Fulbright Fellowship to work at Ban Tha Kok.

On the web: http://www.nku.edu/~anthro/faculty_and_staff/judy_voelker.htm

Pottery production, sales and life in central Thailand

Dr. Voelker’s other Thai research project is a solo effort studying pottery production and culture in the small northeast Thailand village of Ban Tha Kok.

“I was looking at access to the clays, choice of clays, and what they put in the clays for structure. I was also looking at who was involved, whether it was families or related families, how the pottery was used, and finally how it was sold and distributed and discarded,” she said.

Since 1997 she’s followed eight families through five, three-month potting seasons. The villagers made rice, water, and soup vessels among others. During that time she’s found people who are savvy and competitive in selling their wares (creating their own makers’ marks) but who also depend on each other to sustain their daily needs.

In her longest stint, she was in the village for 19 months, and the villagers treated her as a family friend.

Pottery provides a major source of income for the villagers, and some also serve as personal cooking vessels. None of the villagers use the wheel, but all are familiar with that pottery technique. Still, most prefer traditional pottery methods, she said.

Among her most interesting cultural finds was the competition in selling the products.

“I looked at the range of sales and other villagers making pottery. In the neighborhoods where they were selling, there was very little overlap,” she said. “They would fire together, but they would not sell together.”

But the villagers also came together to keep their way of life sustainable with their rice crops. “Each family is required to give some of their rice back to the village. It stays in a rice bank, and that is insurance so they will have seed again,” she said.

Dr. Voelker documented her work in pictures and video with the permission of the villagers. She plans on making three 25-minutes documentaries of: the potting sequence, the Thai marriage ceremony, which lasts up to 24 hours, and rice harvesting. She plans to return to the village in the future to follow up with the families.
At Northern Kentucky University, both graduate and undergraduate student work is an important part of the university’s research efforts. And unlike at many universities, NKU undergraduates get a lot of hands-on research experience, including presenting results at national and international conferences.

Among recent research efforts, in the Department of Psychology is sophomore Ashton Wehrman’s work with faculty sponsor Dr. Mark Bardgett. Together they examined the effect exercise has on adult male mice with damage to a part of the brain that affects memory (the hippocampus). They compared brain-damaged mice to those without brain damage.

First, some mice were housed in cages with running wheels, while others were in regular cages. The animals were then subjected to object-recognition tasks and other memory tests. Next, half of the mice’s hippocampal areas were damaged through surgery.

Both sets of mice were tested again. The results showed no significant increase in memory for the brain-damaged mice that exercised, but mice that exercised did have a significant number of new cells in the hippocampus region. Future studies will look into other forms of memory to determine if increased cell production benefits those forms of memory.
STUDENT RESEARCH HIGHLIGHTS

Student Undergraduate Research Creativity Award Spring 2007

Ian Barnes, Role of connectivity and conjugation of push-pull benzoannulenes, advised by K.C. Russell, chemistry.

Chevelle Cason, Quantification of PAMAM functionalized dendrimer passage across in-vitro blood-brain barrier models, advised by Heather Bullen, chemistry.

Ryan Dumas, Experimental investigation of eutrophication-driven metal accumulation in benthic algae, advised by Rebecca Evans, biological sciences.

Megan Kramer, Thiamine deficiency as an animal model of Korsakoff’s syndrome, advised by Kristi Martines, biological sciences.


Graduate Student Research Grant Spring 2007

Jessica Keel, The relationship between leadership style, work-family interface, and parenting style in police officers, advised by William Attenweiler, psychology.

Stephanie Traylor, Understanding why women enter into prostitution, advised by Gregory Hatchett, human services.

Summer Undergraduate Research/Creativity Fellowship 2007

Carla Schierloh, Impact of brand names and characters on children’s product decision making, advised by Robin Bartlett, psychology.

Ashton Wehrman, Can exercise improve memory after hippocampal damage? advised by Mark Bardgett, psychology.

Student Undergraduate Research Creativity Award Fall 2007


Meghan Flesch, The effect of age and gender on perception of intent associated with generations, advised by Philip Moberg, psychology.

Megan Kramer, Behavioral and neuroanatomical evaluation of thiamine deficiency as an animal model of Korsakoff’s syndrome, advised by Kristi Martines, biological sciences.

Michael Hester, Testing the Passage of Biotinylated G5 PAMAM Dendrimer Nanoparticles Across a Viable In-Vitro Model of the Blood-Brain Barrier, advised by Kristi Martines, biological sciences.

Brett Rossow, Analysis of the permeability of G4 biotinylated dendrimers to the blood-brain barrier, advised by Kristi Martines, biological sciences.

Graduate Student Research Grant Spring/Fall 2007

Tye Mortensen, Online Networks in Process Change and Innovation, advised by Gary Ozanich, communication.