LEWIS UNIVERSITY

Research & Scholarship

In this publication, Lewis University is pleased to showcase many of the fine projects that have been developed by our faculty and students. Last spring Lewis University hosted its inaugural Celebration of Scholarship. This publication is a reflection of several of the projects presented there, as well as additional ongoing research.

Our keynote speaker at the Celebration of Scholarship, Dr. Eric Isaacs, Director of Argonne National Laboratory, addressed the topic of scholarship in the 21st century. He said that, "Being a scholar means being willing to approach a subject with informed curiosity, to delve deeply, and to devote yourself to its mastery."

Lewis students have many opportunities to "delve deeply" into learning, and are exposed to a variety of activities beyond the classroom setting. In the spirit of our Catholic and Lasallian Mission, these activities actively engage our students in learning and in service to others. In addition to student learning, our faculty, in partnership with students are making major advances in research, and putting concepts into practice to solve real world problems and to advance the quality of life.

Increasingly our faculty are working in interdisciplinary teams on research being conducted in partnership with local and international corporations, laboratories and federal agencies. Our new Science Center will continue to have a significant impact on the surrounding community and region as we enter into future partnerships. Among our priorities is to address the national needs in the Science, Technology, Engineering and Math (STEM) areas important to the advancement of our country.

I invite you to learn more about the projects underway here at Lewis University. You will read about research in energy, new chemical materials, microorganisms and related disease states, global market activities and new ways of teaching and learning. You will also see that research and scholarship at Lewis focuses on values as we address issues related to social justice, environmental responsibility and human dignity. We hope that you will join us in our celebration of scholarship and learn about how our faculty and students are creating a positive impact on this region, and making a real difference in the lives of others.

Sincerely,

Stephany Schlachter

Dr. Stephany Schlachter
Provost

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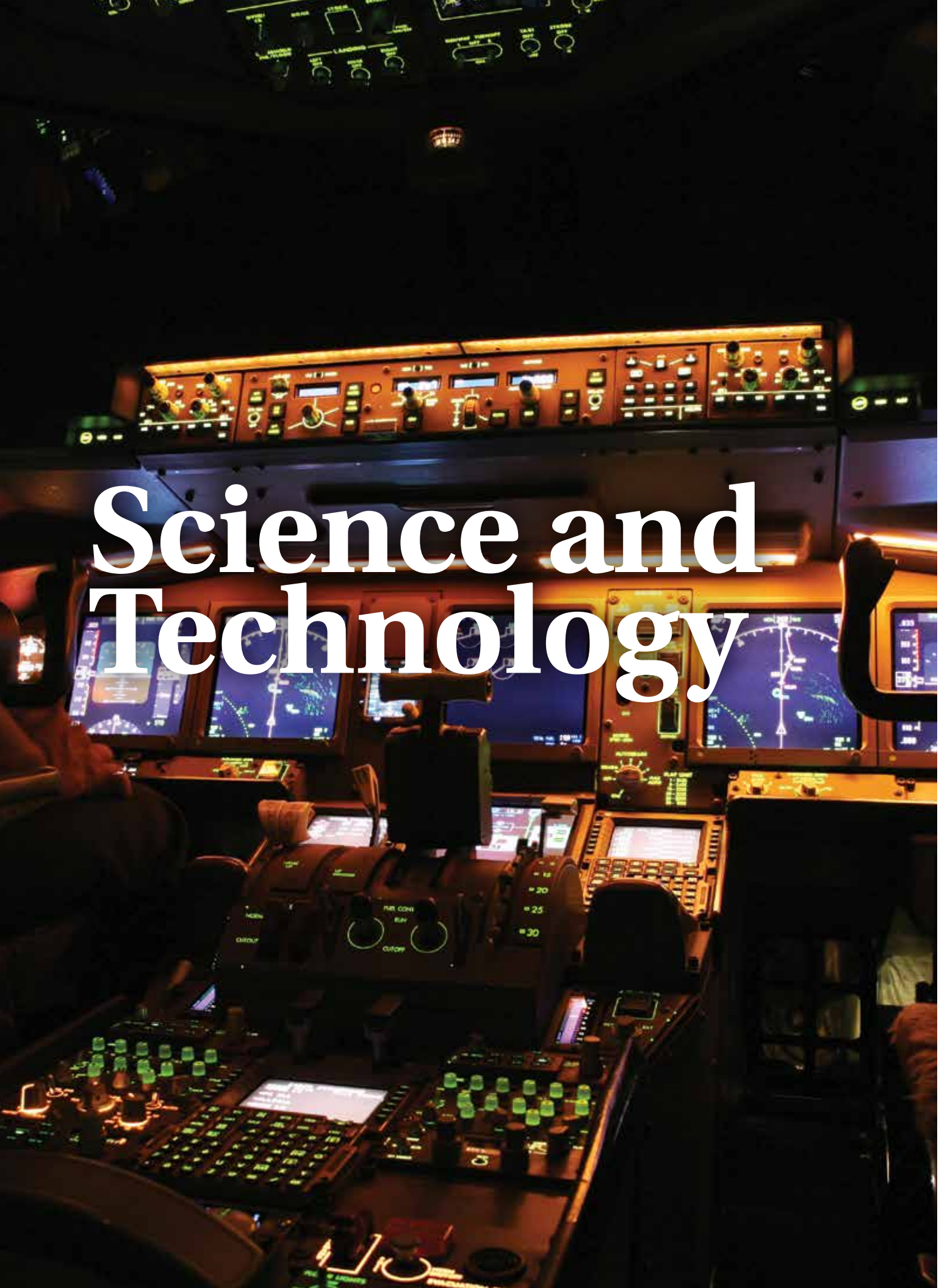


Science and Technology

Laser Study

Aims to Make Pilots and Passengers Safer in the Air

Imagine piloting a commercial airplane in to a landing, when you are suddenly distracted by a flash of bright green light. Your co-pilot takes over, safely bringing the aircraft home. You were lucky this time, but things could have been much worse. ***Dr. Randy DeMik*** *and a team of Lewis University professors and students from disciplines in aviation and physics are studying the effects of laser attacks, ever more common, on pilots of commercial and private planes.*

Lewis University Associate Professor of Aviation Dr. Randy DeMik, also a professional pilot and captain with a major commercial airliner, has fortunately never had the experience of a laser in his eyes during his 21 years on the job. It happens, though, all too frequently.

"Pilots today are dealing with this issue at an alarming rate," DeMik said. "I get calls about it all the time. There have been more than 3,000 reported incidents this year alone, and it's increasing despite the Federal Aviation Administration (FAA) cracking down and increasing fines."

Alarmingly, it only takes an inexpensive, relatively low-tech boardroom laser pointer to do the damage. And the damage can be great. Although DeMik said none of the laser events to date has led to an accident, the unexpected flash of intense light in the cockpit can disorient pilots, taking their focus off critical landing maneuvers.

"It can certainly cause a distraction in the cockpit," DeMik explained, "and more importantly can affect the pilots' vision since it takes some time to recover. That small little point of light on a classroom white board can diffuse out with distance to three to four feet across."

DeMik partnered with fellow Lewis University aviation and physics professors, along with a team of undergraduate and graduate students, to study the intensity of laser light inside flight decks of aviation planes and airliners after lasers of varying wavelengths were shone at the windshield from several distances.

The team aimed red, green, and violet lasers at airplane windscreens at distances of up to 2,500-feet.

"At distances of 1,000 to 2,500-feet," he said, "the light may not be damaging to the eye, but can cause temporary flash blindness, glare or disruption, and distraction or startle. But at closer distances, we can record light that penetrates the flight deck that can exceed the federal limits for safe exposure."

The results of the study indicated that the selected low power lasers measured at distances from 200' to 2000' would likely not cause permanent retinal damage. Potential eye damage readings occurred at closer distances of 200' and 500'. Green lasers are the focus of concern as 91% of laser strikes are with lasers of this color.

As darkness increases, the rods in the human eye become more active making the human eye more sensitive to green light even if the lasers are at similar output powers. As a result, the green laser beams appear to be brighter than other colors.

In their next research project, DeMik's team plans to include Lewis University's Department of Chemistry to explore the possibility of applying solutions to aircraft windshields in attempt to diffuse laser light entrance into the cockpit.

Since 1932, Lewis University has led the field of Aviation Education, preparing students from around the world to succeed in the aviation industries. With an on-site airport, experienced and industry-leading faculty, and personalized learning with less than 15 students per class, Lewis University is a place where careers take flight.

**This research was sponsored, in part, by a grant from the Colonel Stephen S. and Lyla Doherty Center for Aviation and Health Research.*

Chicago Municipalities

Provide Impetus for ***Staphylococcus aureus*** Research

It's a fact that many hospitals today continue to battle in-house bacteria that have developed resistance to antibiotics. Methicillin-resistant Staphylococcus aureus *(MRSA) is a particularly virulent bacterium, and other species, such as* Clostridium difficile *(C. diff) continue on their own paths to antibiotic resistance. Even ordinary staph germs can infect vulnerable patients and cause infections of the bones, joints, the blood, and organs such as the lungs, heart or brain.*

Lewis University Associate Professor of Biology, ***Dr. James Rago****, formed an alliance with Lieutenant Keith Buhs of the Orland Fire Protection District to conduct a research project sampling ambulances from 34 Chicago metropolitan municipalities for strains of* S. aureus. *And what he found was good news.*

**This research was sponsored, in part, by a grant from the Colonel Stephen S. and Lyla Doherty Center for Aviation and Health Research.*

Patients who require the use of emergency medical service ambulances are often vulnerable to infection. Open wounds, heart conditions, pulmonary illnesses, a compromised immune system from chronic disease, and other serious medical problems leave patients at higher risk of bacterial infections taking root before the patient even arrives at the emergency room.

"Anytime you have patients in an operating room, waiting room, hospital room, or an ambulance, you need to be sure the surroundings are very clean," Dr. Rago explained. "Those patients are compromised. They are in a more sensitive state, and their bodies yield more opportunities for bacteria to enter."

Dr. Rago had been approached by Lt. Buhs with the proposition of helping not only the Orland Fire Protection District, but also several others throughout the area, evaluate the cleanliness of their ambulance fleets. Rago, an expert in *Staphylococcus* bacteria, took up the challenge and set up a research team of his Lewis biology students to sample emergency vehicles for the bacteria.

The team took samples in a total of 71 ambulances across 34 communities in eight counties in northern Illinois. Each ambulance was sampled on 26 different surfaces, such as on oxygen tanks, pulse ox finger sensors, ECG leads, stethoscopes, and blood pressure cuffs, and also on such non-medical surfaces as the steering wheel, laptop keypad, radio microphone, and bench seats.

The swabs were used to inoculate agar Petri dishes on site, which were then taken back to the Lewis University biology laboratory and

grown for bacteria. The team tested the bacterial colonies that grew for the presence of *S. aureus*, then they further tested those isolates for resistance to a panel of antibiotics, including ampicillin, bacitracin, cefoxitin, erythromycin, oxacillin, trimethoprim-sulfamethoxazole, tetracycline, and vancomycin.

Although strains of resistant *S. aureus* were found, the numbers were not above what Rago said he expected on any public surface anywhere.

At least one *S. aureus* isolate was found in approximately 69% of all ambulances in the study. Of all isolates detected, 77% showed resistance to at least one antibiotic, and 34% displayed resistance to two or more antibiotics.

"The numbers were lower than expected," he said. "It was actually good news. For the most part, we found they are taking ambulance-cleaning seriously."

There were some hot spots in many of the vehicles, however, and Rago forwarded the results of his study to the fire districts. One of the surfaces that concerned him were the pulse ox finger sensors, on which five were found to harbor

Methicillin-sensitive *S. aureus*, and on seven were Methicillin-resistant *S. aureus*. That wasn't surprising, though, he said, as those particular instruments are sensitive to strong antimicrobial cleansers and are difficult to sterilize thoroughly.

In all, three quarters of the *Staphylococcus* bacteria isolates the group found in the ambulances were resistant to ampicillin.

"This is information the municipal departments can use to make any changes they deem important," Rago said.

Follow-up studies are planned to examine the presence of bacteria before and after treatment of ambulance surfaces with various cleansing agents.

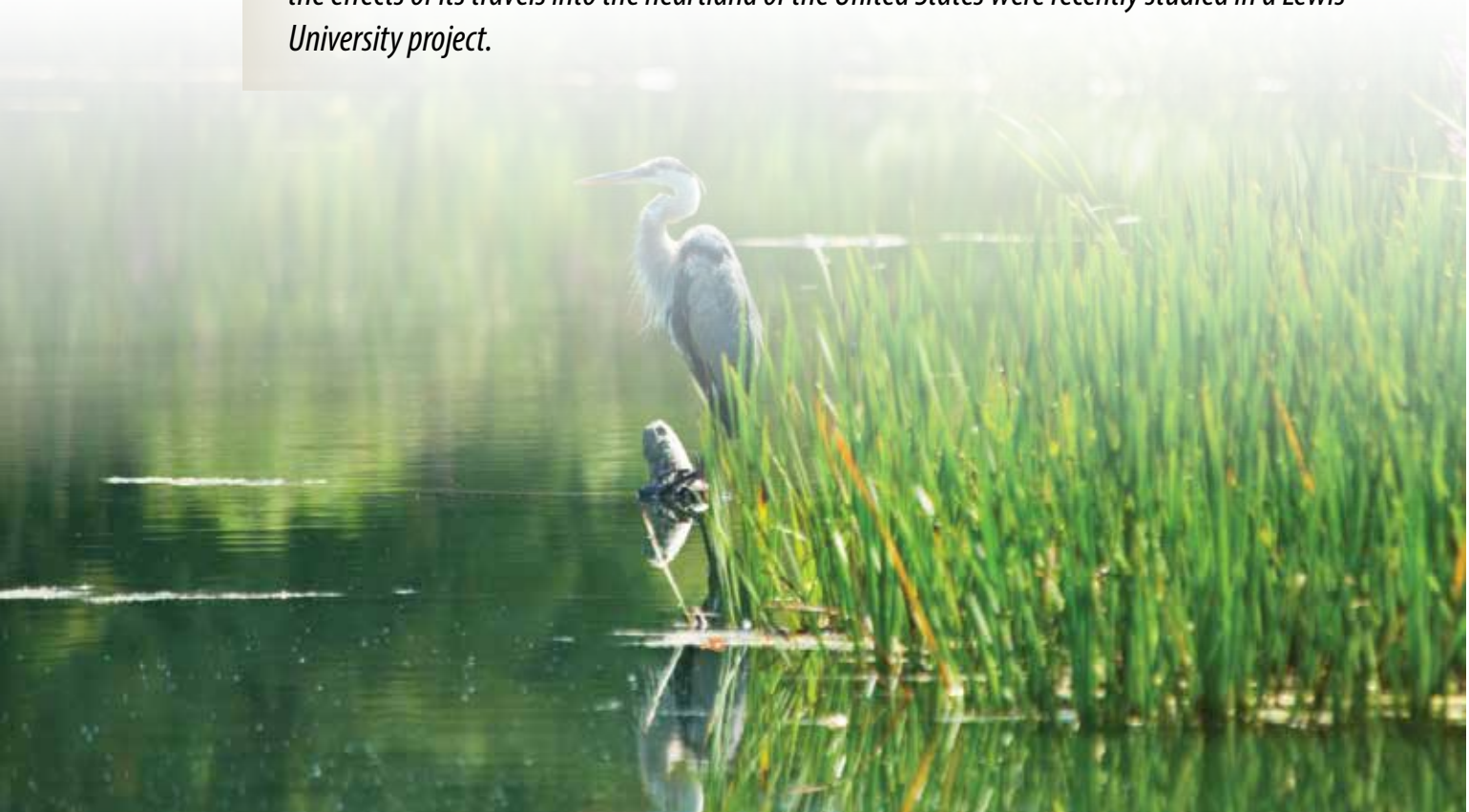
Rapid Expansion of Invasive *Phragmites australis*

Disrupts Native Ecosystems

***Dr. Erin Zimmer**, Associate Professor of Biology*

When plants and animals make their way into foreign lands, the results can be devastating to native ecosystems that have over thousands of years achieved a balance of existence. Illinois is currently seeing the negative effects of invasive populations of zebra mussels that have taken up residence in Lake Michigan and of Asian carp, which are making their way up the Illinois River toward the Great Lakes.

Another foreign invader is the Eurasian subspecies of the common reed, Phragmites australis*, and the effects of its travels into the heartland of the United States were recently studied in a Lewis University project.*



"*Phragmites*- dominated areas have less species diversity in freshwater, tidal and brackish water tidal ecosystems"

~ Danielle Mount

The native American reed, *Phragmites,* subspecies *americanus,* has been growing in harmony with other native plants and animals for about 10,000 years. A tall grass that grows in wetland areas, it co-exists with other water-loving natives, such as cattails, bulrushes, and sedges.

The non-native *Phragmites,* however, as Lewis University graduate Danielle Mount discovered, is not behaving as such a good ecosystem neighbor.

Mount conducted field research on the reed as an intern with the DuPage County Forest Preserve, then continued her academic studies on the subject as a senior in Lewis University's Department of Biology under the mentorship of associate professor Dr. Erin Zimmer.

What she discovered was a rapid expansion of *Phragmites* into the Midwest over the last 50 years and an overall negative effect of the invasion on native ecosystems.

"In biology, we use ecosystems as a model to study life forms at all levels," Dr. Zimmer explained. "When we teach about healthy ecosystems, we want students to see that interdependence among organisms and between the environment and those organisms. It's important to study the effects of introducing a new organism into those relationships, which often results in an imbalance and detrimental effects to native species. We're all dependent on these interactions, and if we imbalance them, it's going to affect us, as well."

Non-native *Phragmites* is thought to have been carried into the United States in ship ballasts about a hundred years ago. It began its residence here on the eastern seaboard. A salt- and water-loving plant, it quickly established itself along coastlines of both fresh and salt water. As Mount learned, it quickly spread west with the creation of the interstate highway system, carried with traffic to damp roadside ditches.

In Europe, the subspecies had thousands of years to form an interrelationship with other flora and fauna. In the U.S., however, it's behaving as somewhat of an aggressive bully.

"*Phragmites*- dominated areas have less species diversity in freshwater, tidal and brackish water tidal ecosystems," according to Mount.

In addition to outcompeting native water-loving plants, the plant also has been seen to decrease the variety of bird species.

Native ecosystems in Connecticut's salt marshes contain marsh wren, red-winged blackbird, and swamp sparrows. Areas where the non-native reed has invaded do not have as many of these birds. Its establishment is also further endangering populations of threatened birds.

"Birds on the Connecticut threatened species list, such as willet, seaside sparrow, and sharp-tailed sparrow, were not found in *Phragmites*-dominated areas," Mount reported. "The tall *Phragmites* monoculture stands are not conducive to their breeding and nesting needs."

Mount said the invasive reed subspecies takes substantially more nutrients from the environment to grow taller and denser than the native varieties, uses more water, increases sedimentation that alters growth of native species, and secretes a toxin from its roots that hinders growth of other plants.

Small Problems with Big Impact

***Dr. Jason Keleher**, Chairman, Department of Chemistry*

Nanotechnology, whose prefix "nano" represents one-billionth of a unit, utilizes the "science of the small," to manipulate systems at the level of atoms, molecules, and supramolecular assemblies. Control of matter at the nanoscale already plays an important role in scientific disciplines as diverse as physics, chemistry, materials science, biology, medicine, engineering, and computer simulation. The integration of nanomaterials into working systems has proven to be a significant and long-term global challenge. Key mechanisms of these processes are still being uncovered, and research to harness the full potential of nanomaterials represents a formidable challenge to both the academic and industrial communities.

**This research was sponsored, in part, by a grant from the Colonel Stephen S. and Lyla Doherty Center for Aviation and Health Research and Caterpillar Scholar Award.*

Dr. Jason Keleher, Chairman of the Department of Chemistry, currently has about 16 undergraduate students who are focused on the synthesis and characterization of nanomaterials for a wide range of applications such as surfaces that have antibacterial functionality, biomimetic materials for next generation wound management, functionalized nanowires for next generation solar energy applications, and mechanistic studies relevant to next generation of semiconductor device fabrication.

The students are involved in hands-on learning in the laboratory to apply the fundamental theories of organic, inorganic, and colloidal/supramolecular chemistry and create a bridge between other disciplines such as biology, physics, material science, and aviation. In addition they are working with local companies in the process of research, going on-site to meet with their scientists and working with them collaboratively.

Dr. Keleher said, "I think the best way to learn science is to actually do science. My students get into the lab in their freshman year and start working on problems that are relevant to society."

For the second consecutive year, the papers of Keleher students were presented at the International Conference on Planarization/CMP Technology. The papers were in collaboration with Pall Corporation. Lewis alumnus Vince Schade's study "Abrasive Nanoparticle/Filter Media Interactions" was presented in 2011 at the conference in South Korea. Lewis student Jordan Kaiser's study, "Role of Abrasive Type and Media Surface Energy on Nanoparticle Adsorption" was presented in 2012 in France.

"I think the best way to learn science is to actually do science. My students get into the lab in their freshman year and start working on problems that are relevant to society."

~ Dr. Jason Keleher

"These studies are a good example of how our students are learning to partner with industry on research that can lead to state-of-the-art commercial solutions," said Keleher.

Internationally and locally, industry partners are working with Lewis University to utilize its facilities, research abilities and knowledge base in nanotechnology. Nanophase Technology Corporation in Romeoville entered into collaboration with Lewis University to investigate aspects of engineered nanoparticle dispersions in polishing applications. Keleher served again as the principal collaborator while he mentored Lewis University student Alessandro Mazza, who conducted the research.

"The collaboration provides a unique experience for our undergraduate students. Nanophase is another industry leader we are partnering with to address global scientific challenges," commented Keleher.

The ability to develop solutions to very complex problems on the nanoscale requires a very family-oriented approach. According to Dr. Keleher science is only part of the research process in his research group. Students who work in the group end up having an extended family that is fostered through the innovation and problem solving process, often continuing well after graduation.

Computer Science Research Aimed to Protect Electric Grid from Cybersecurity Attacks

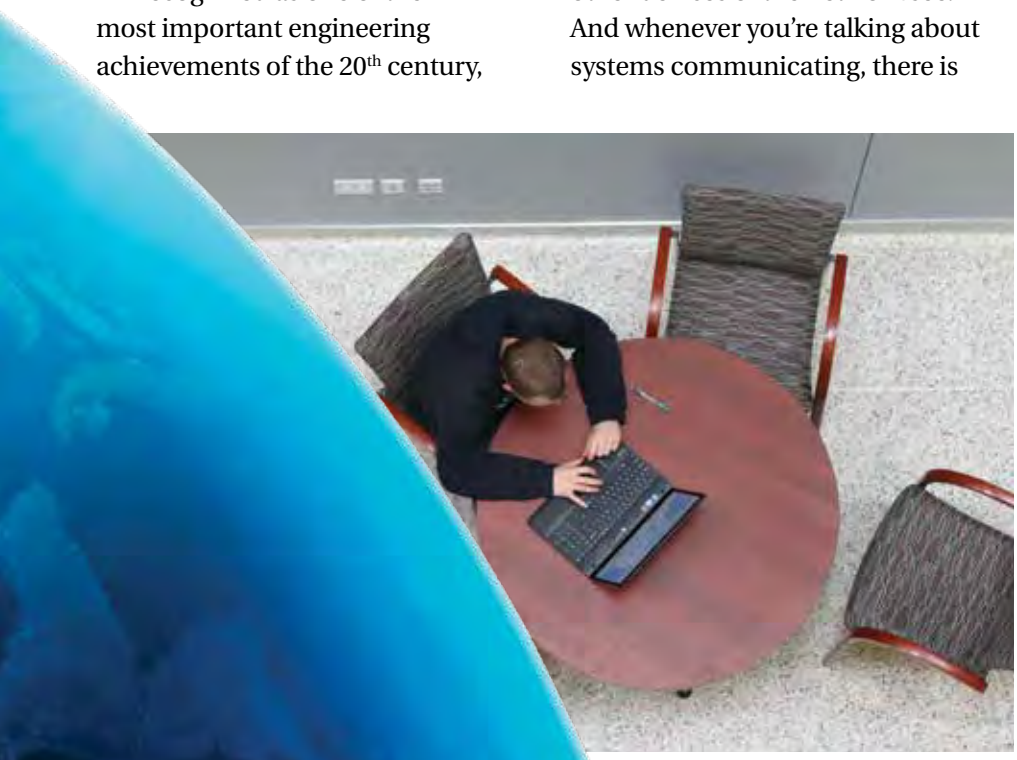
*This research was sponsored, in part, by the Lewis Scholar Award.

The impact of the computer virus Stuxnet in damaging Iran's nuclear facility has opened concerns about the safety of our own nation's infrastructure, particularly the power grid. Many electricity providers are in the process of upgrading their infrastructure to include smart grids, with various systems that interact with each other digitally. A virus or worm slipped into one system could wreak havoc on the entire grid. The research of Lewis University's ***Dr. Ray Klump*** *aims to protect our country's valuable electric grid against such attacks.*

According to Dr. Klump, Chairman of the Department of Mathematics and Computer Science, our nation's critical infrastructures are increasingly impacted by cybersecurity incidents. Water, gas, electricity, and transportation need to be tightly protected from these attacks. Between 2000 and 2004 alone, there was a 10-fold increase in successful cyberattacks on the power grid.

Recognized as one of the most important engineering achievements of the 20th century, the current electrical power grids are long outdated. Efforts are being made to modernize the system for efficiency and to support renewable energy sources.

"To be able to create this more modern vision of the electrical power grid," Klump says, "we need all these devices that act automatically and communicate with each other to make real time decisions, informed by what the other devices of the network see. And whenever you're talking about systems communicating, there is the potential to get hacked into by someone wanting to do harm."



The same types of malware that can infect our personal home computers can affect the larger systems of the power grid. The potential is worrisome.

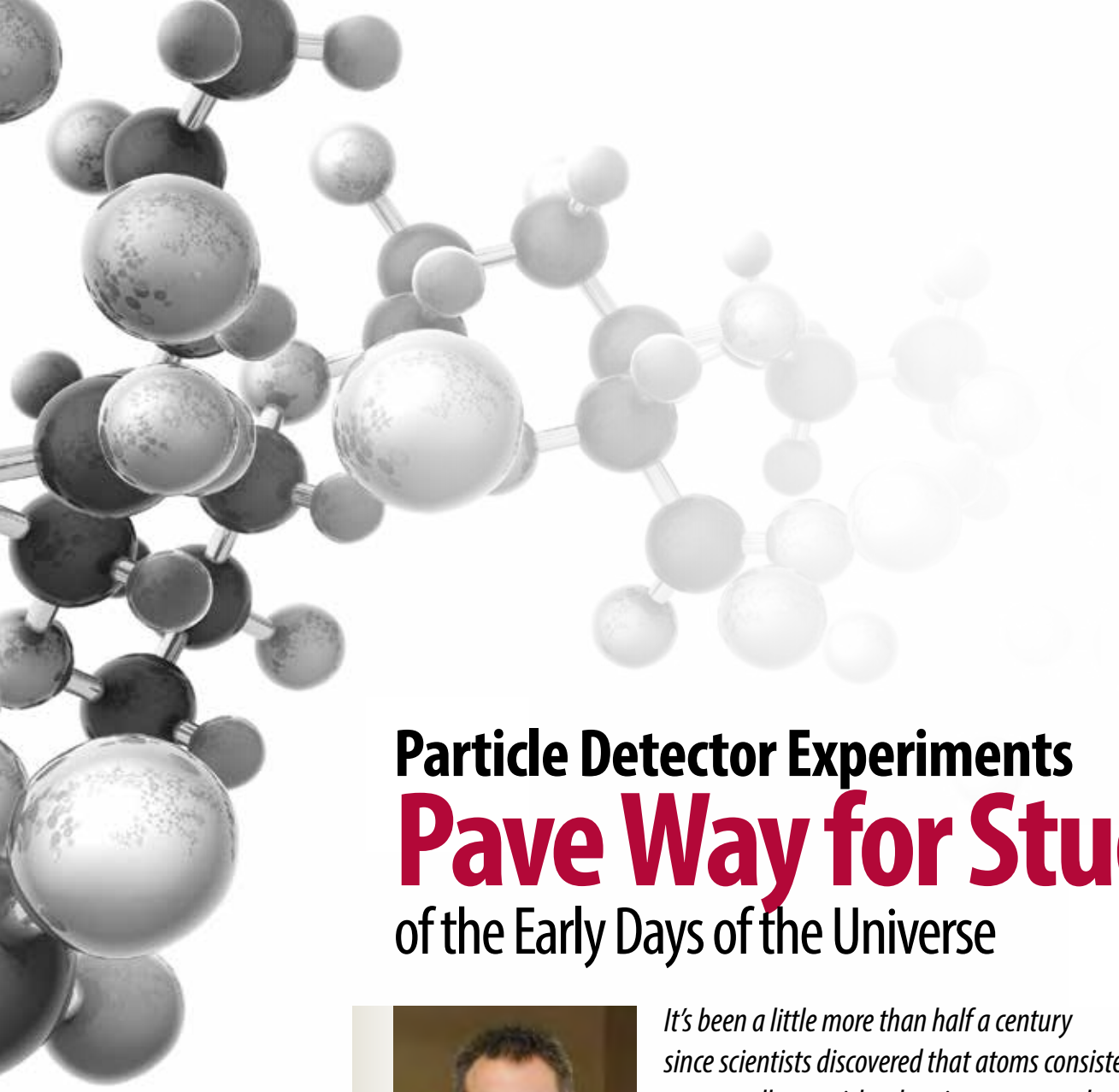
"The most immediate concern is that neighborhoods and businesses could lose power," Klump explained, "and our modern way of life could shut down. It would have a seriously detrimental impact on every aspect of our life."

He gives the example of the New York City blackout of 1965 and the northeastern blackout of 2003. Fifty million people here and in Canada were without power for several hours in the heat of the summer.

Klump and collaborators have written simulation programs of how the electrical grid operates and how its data can best be compressed and secured. Currently, he is exploring how utilities can better detect cyber threats and communicate the intrusions to other systems in real time.

"Basically, it's how utilities can make each other aware of a threat that they have encountered," he explained. "All of these utilities have intrusion detection systems which automatically check out the traffic that is coming into them. If anything looks suspicious, they flag it and report it. It would be very beneficial to be able to alert neighboring utilities about the attacks, as well."

On notification of attacks, other systems around the country would be able to take immediate action to protect themselves against similar attacks. Klump is working on simulation software that will allow testing of these models.



Particle Detector Experiments

Pave Way for Studies

of the Early Days of the Universe

It's been a little more than half a century since scientists discovered that atoms consisted of even smaller particles than just protons, electrons, and neutrons. In the years since, around 200 such particles have been found, most by colliding particles traveling near the speed of light against each other or at targets.

The celebrated Fermilab Tevatron Accelerator in Illinois and the CERN Large Hadron Collider in Switzerland are two centers where physicists have discovered and studied these tiniest of bits of matter. Lewis University's ***Dr. Joe Kozminski****, Chairman of the Department of Physics, is now using computer simulations of muon beam experiments to help design a particle physics experiment at Fermilab that will help scientists uncover the very nature of matter, energy, space, and time.*

The search for the most fundamental particles of matter and energy has always been an exciting field, from the days of the ancient Greek philosopher Democritis who wondered how many times a piece of matter could be broken down until it was at its tiniest particles. He termed those particles, "atoms."

Recently, scientists at CERN, the most powerful accelerator in the world, found evidence of the long-sought Higgs boson, further confirmation of the theory of the "Standard Model" of particle physics.

Dr. Kozminski, Associate Professor of Physics, and his student Elizabeth DeWaard at Lewis University, along with collaborators at Northern Illinois University, are working on simulations that will aid in designing "Mu2e," or muon-to-electron conversion, experiments. Mu2e is a high-intensity muon beam experiment.

Muons are tiny charged particles similar to electrons, but 200 times more massive. They are elementary particles, but when they are accelerated at a high speed and smashed into a surface, they break into smaller particles such as electrons and neutrinos.

Muons decay very quickly all on their own, as well, existing for only 2 microseconds after they are formed. Within the experimental muon beam, decay is constant, and the decay products typically fly out of the beam and interact with matter in the beam line, in the shielding and the magnets, and even in the detector, yielding additional particles that can produce a noisy background, obscuring the tiny signals the scientists are seeking.

The computer simulations Kozminski's group are performing, examine the interactions of the neutrons by-products with several of the materials that could be used in the Mu2e detector, such as steel, iron, tungsten, aluminum, concrete, polyethylene, polyethylene doped with boron, and polyethylene doped with lithium.

The Mu2e experiment is being designed to look for neutrino-less muon decays, an ultra-rare process in which muons can decay directly to electrons without any neutrinos present. Observing such decays would help physicists better understand the universe shortly after the Big Bang, according to Kozminski, when there existed an enormous amount of unstable particles like muons. Learning about the breakdown of muons, he said, will give us more fundamental knowledge about the early evolution of the universe.

"Learning about the breakdown of muons will give us more fundamental knowledge about the early evolution of the universe."

~ Dr. Joe Kozminski

Biofilms:

A Healthy Natural, or Treacherously Unnatural, Layer of Germs

On many surfaces in the environment, there grows a complex layer of microorganisms that protect their mini-habitat with a "slime," or biofilm. Surprisingly, biofilms can grow in homes, too, and office buildings and even, to a deadly degree, in hospitals. Lewis University Director of Environmental Science and Associate Professor of Biology, ***Dr. Jerry Kavouras****, is conducting research to better understand the basic mechanisms of formation of these biofilms.*

**This research was sponsored, in part, by a grant from the Colonel Stephen S. and Lyla Doherty Center for Aviation and Health Research.*

In every ecosystem, bacteria, fungi, and other microorganisms have found a way to adhere to surfaces and interact with others of their kind. Frequently, they produce a kind of slimy substance made of complex sugars and proteins that protect them from their surroundings. This aggregate of the tiniest of living organisms plus their secretions is called a biofilm.

Think of them on the surfaces of rocks in a river or on moist leaves on the ground in the fall. They play critical roles in the environment, including nitrogen fixation in soil, breakdown of organic matter, and even the removal of toxic heavy metal pollutants.

Biofilms can also thrive in our households - in showers, sinks, floors and counters, and in cooling and heating systems.

And whether we like it or not, they are also an essential part of our own bodies, helping to regulate our health on our skin, in our lungs, and in our gut.

"Bacteria have co-evolved with animals for millions of years," Kavouras says, "and it's bacterial signals that are triggering things in our development. They also prevent opportunistic bacteria from taking hold and causing us harm. We need them. We have to have them."

However, biofilms can become dangerous, even deadly, to us, usually when we are in a vulnerable state – in the hospital ill or recovering from surgery or immunocompromised in some way. One of Kavouras's research projects involves studying how such common and disease-producing bacteria as *Staphylococcus aureus* and *Escherichia coli* form biofilms on glass and plastic – two common hospital surfaces.

Working with a team of his students and Lewis University Department of Chemistry Chairman Dr. Jason Keleher, Kavouras developed biofilms under different environmental conditions to understand how factors like temperature, surface chemistry, and nutrients affect the biofilm structure.

The research is an important first step, he explained, to understand how the environment influences biofilm formation in real settings, such as in hospitals.

"These bacteria have the ability to form biofilms and hang around for very long periods of time," he said, "on linens and sheets, in intubation tubes, in catheters, and on other surfaces in medical centers. And when they're in biofilms, they are much more difficult to eradicate with antibiotics."

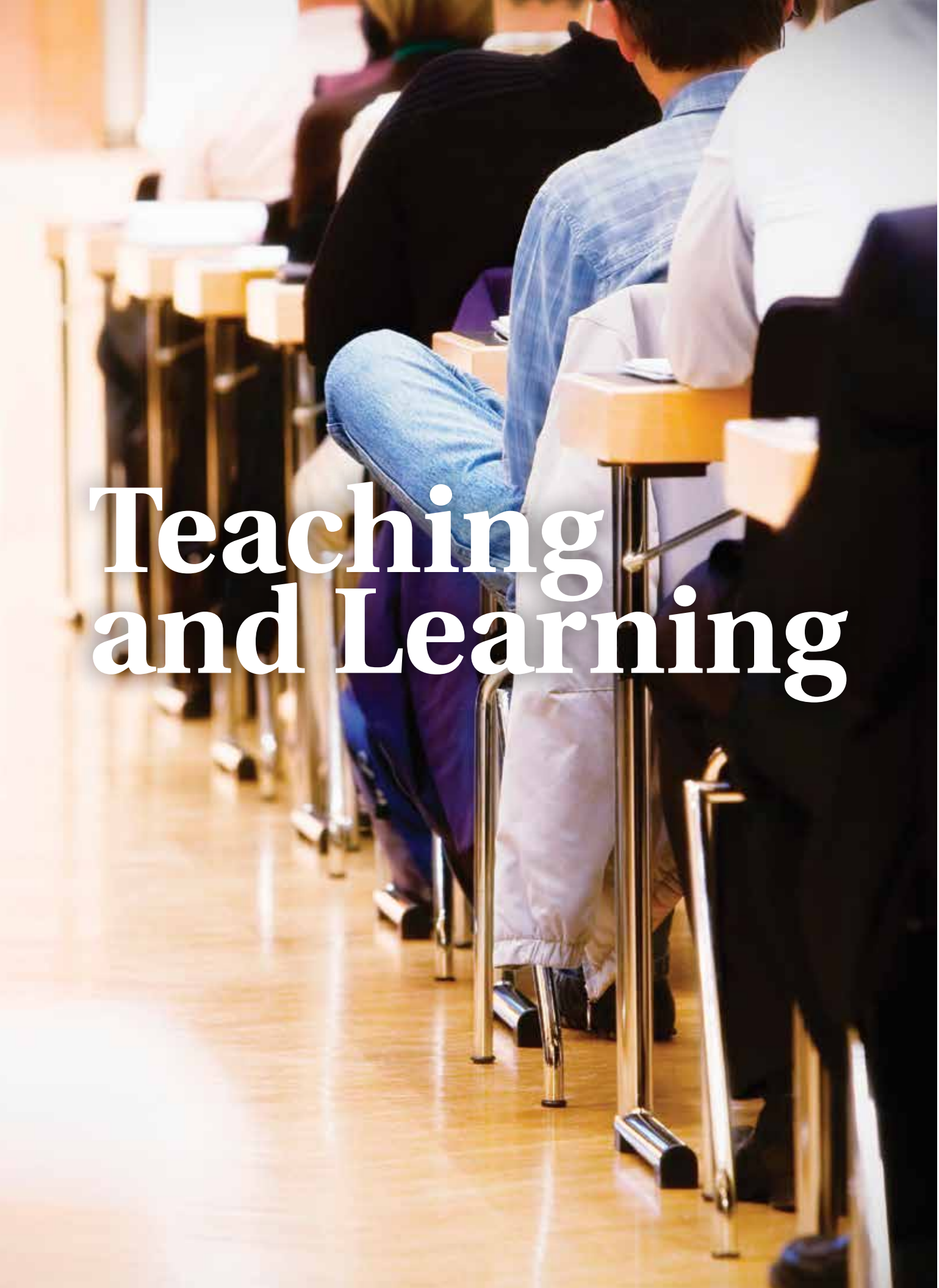
Kavouras also studies biofilms in the Great Lakes and how they promote the surface attachment of two invasive species of mussels. It's a huge problem, he said.

"These mussels clog up water intake pipes, attach to hulls of boats, and even sink navigation buoys with their weight," he said. "They cost businesses billions of dollars a year."

Once the characteristics of the biofilm layer to which the mussels attach are understood, surfaces might be created to discourage their attachment.

"Bacteria have co-evolved with animals for millions of years and it's bacterial signals that are triggering things in our development."

~ Dr. Jerry Kavouras



Teaching and Learning

Area Teachers Partner with Lewis Students

in Co-teaching Pilot Program

***Dr. Pamela Jessee**, Interim Dean, College of Education*

By the time Lewis University's education majors begin their senior year student teaching, they have already completed 100-150 hours in the classroom. They are ready to experience leading their own classes of students.

Rather than spending their first few weeks observing their cooperating teachers, Lewis University is piloting a program that allows its student teachers, or "teacher candidates" as they are known today, to begin teaching alongside the teacher right away, thus allowing two professionally-prepared adults to actively engage with students from day one.

Part of the vision of the Lewis University College of Education is to be recognized as a leader in providing collaborative preparation programs for educators. The student teaching experience, normally undertaken the last semester of the student's senior year, is a prime example of this.

For the past two years, faculty in the College have been exploring the viability of a new co-teaching model. In 2010, Drs. Pamela Jessee, Dorene Huvaere, and Sue O'Brien, among others, completed a pilot study with the goal of more fully understanding the benefits and challenges of co-teaching.

Data were collected through quantitative and qualitative methodology that looked at degrees of satisfaction by both the pre-service candidate and the cooperating teacher.

Qualitative data were collected through the use of the pre-service candidate's reflective journal entries and focus groups.

Traditional student teaching situations involve the teacher candidate observing for a few weeks then gradually taking on teaching duties, teaching alone only for the last few weeks.

With the co-teaching model, teacher candidates work together with their cooperating teachers to give the candidates more upfront, hands-on time. It also allows the cooperating teachers to spend more time mentoring the candidates, and students have shown higher test scores in co-teaching situations, as well.

"The student teaching model has not changed significantly in 70 years," Dr. Jessee said. "The American Association of Colleges for Teacher Education has just published a blue ribbon report citing co-teaching as best practice in field and clinical situations, and with that, there has come a nationwide push for co-teaching."

The benefits of co-teaching, according to Jessee, include the fact that it allows two professionally prepared adults to actively engage with students. It also provides opportunities for more students to receive help when they need it and for the differentiation of instruction and assessment through the use of flexible grouping, small group instruction and adaptations for students with unique learning needs.

"Our research is asking us what we need to have in our curriculum for our students so that we may equip them with the collaboration and communication skills they need," Jessee said. "It also helps us develop strategies for the cooperating teachers, defining what it means to be a mentor and how to give their teacher candidates constructive feedback."

Reading Strategies

Support Secondary Science Teachers

It's an admirable goal to educate oneself, but many Lewis University students go a step beyond to become educators themselves. Some even make it their goal to coach and expand the skills of other teachers.

Master's-level students in the College of Education are encouraged to present their research findings to peer groups of working teachers, supervised by Professor of Reading and Literacy, ***Dr. Joyce Hayward****.*

"We want our graduate students to be very practical, and we also want them to be scholars," Hayward says. "We want them to be able to look at the research base that undergirds their studies and relay that information to other educators. This not only increases their own understanding, but it also betters the whole education community."

Research and presentations by two of Hayward's recent graduate students accomplished that goal. Mary Gelezauskas was one of them.

Once students reach middle school, they are expected to be able to read at a certain proficiency. But not all of them reach that goal.

Teachers in these classrooms are typically content-trained," Hayward explained. "They are not necessarily trained in teaching students to read or to help support those who have difficulty understanding the textbook."

In grade school, reading comprehension is aided by a variety of colorful, illustrative pictures in textbooks, but beginning around sixth grade, the numbers of those pictures in classroom books declines fairly dramatically. In addition, textbooks at that level are usually written at a reading level between one and three years higher than the grade for which they are intended.

Hayward's graduate student Mary Gelezauskas could see the potential in exposing middle school students to pictures in supplemental books that would directly relate to their grade level curricula.

"It is a common misconception among educators that picture books only have a place in the primary classrooms," Gelezauskas presented in her research.

A good, sophisticated picture book used alongside a textbook can help students relate to the content.

It can allow students to make more connections among different subjects, can give a visual historical perspective, and can be a way to point out certain literary elements difficult to pick up on otherwise.

"Picture books provide a face or vision to the people, times, and situations students are learning about," Gelezauskas said. "They are also perfect for struggling readers and the English Language Learner (ELL) student population."

Hayward said picture books are a nice place to begin new content, as they are not quite as intimidating as page after page of text.

Lewis University graduate student Kimberly Guidinger, also under the auspices of Dr. Hayward, presented research to her educator peers on the topic of how high school science teachers can use the KLEW reading strategy method to help struggling readers grasp the often complicated concepts of the subject.

A significant number of students have reading difficulties entering high school, Guidinger presented in her research, and for subjects like science, reading deficiencies can make understanding complex concepts virtually impossible.

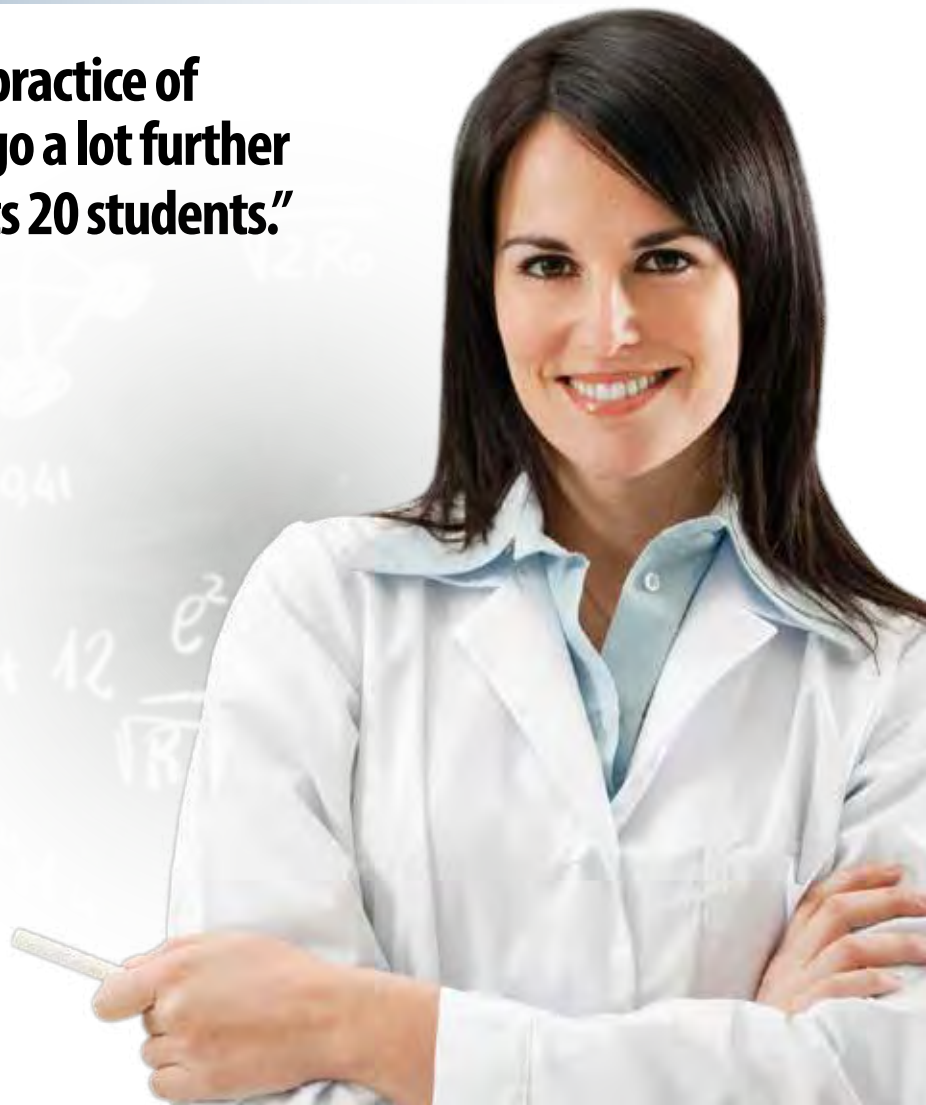
Guidinger, a high school science teacher herself, presented her findings to a peer group, explaining in specific terms how fellow teachers can use the reading method to help their students grasp the important world of science.

"Kimberly provided these teachers with some new ideas," Hayward said. "Her presentation to professional teachers gave them something they could turn around and use tomorrow."

Both Guidinger and Gelezauskas presented their research to the Will County Reading Council, an organization of practicing teachers. Reading specialists at Lewis University are taught not only how to work with students, but also with teachers, coaching them on the latest education academic research findings and how to adapt them to their own classrooms.

"If one person can impact the practice of 20 teachers, the changes will go a lot further than when one person impacts 20 students."

~ Dr. Joyce Hayward



Health and Human Services

Evidence -Based Practice
Strengthens Patient Care

***Dr. Kathleen Fitzgerald**, Assistant Professor of Nursing*

In the past, medical care was sometimes given over to tradition or rule-of-thumb. Today, an interdisciplinary way of treatment called "evidence-based practice" is gaining ground in clinical settings.

Surprisingly, medical care based on lessons learned through research and proven track record has not always been the norm. Some hospitals and clinics have treated patients based on lore drawn from the knowhow of generations of practitioners with very little scientific evidence.

Today's nursing students at Lewis University, however, are learning how to provide care by using the best available evidence through research findings. Assistant Professor of Nursing in the College of Nursing and Health Professions, Dr. Kathleen Fitzgerald, is on the forefront of teaching this method.

"Evidence-based practice standardizes treatment so that wherever you go, you're going to get the best care," Fitzgerald explained. "Before, if you had a heart attack in Utah, for example, you would receive different care than if you had a heart attack in Chicago. We are teaching our baccalaureate nurses what evidence-based practice is and how to do it. The method is currently in its developmental phase primarily in the fields of education, psychology, and in nursing."

Fitzgerald and Dr. Stacie Elder, Associate Professor of Nursing, recently presented results from their study, "Translating Evidence into Practice – Redesigning a Nursing Research Course," which evaluated the evidence-based practice education Lewis University nursing students receive in their nursing research course. The department is in the process of adapting its curriculum to show its students how to be able to use research studies to augment classroom learning and to eventually benefit them and their patients in clinical settings.

"We want them to use textbooks," Fitzgerald said, "but in the medical and nursing fields, textbooks can be outdated six months after they're written. We want our students to also look at what's out there in the current literature and be able to utilize it into their nursing care. Keeping up on the latest research is important in keeping up in our profession."

To achieve this goal, Lewis nursing students' education will include computer literacy exercises; a workshop with the librarian for database searching; exams to assess knowledge acquisition; more detailed content added on evidence-based practice and quality improvement; critical appraisal of research studies with focus on their potential use in evidence-based practice; and a group poster project on an evidence-based practice topic.

The students also learn that a patient's needs and values should also be taken into consideration when making decisions about their care. An example is cancer care. There is more than one way to treat most types of cancer, Fitzgerald said. Knowing how to research the treatments can help nurses understand why a physician chose a certain direction. In addition, to make their decisions, physicians must also know the needs and the values of each particular patient. Nurses many times know their patients better than anyone and can help relay that understanding to the physician.

Nursing Faculty and Student Teams

Design New Simulator Programs

***Dr. Gwen Svoboda**, Interim Director, Graduate Studies*

Simulator mannequins used in nursing programs meet a variety of educational objectives. The high tech, or high fidelity, models can be programmed and controlled at remote locations to produce vital signs and other physiological cues similar to what would be observed in human patients.

The Lewis University College of Nursing and Health Professions recently designed and implemented two simulations programs – one for congestive heart failure and another for pulmonary embolism. The programs were designed by the University's own students.

Simulations in nursing education have been used at least as far back as World War II. Static and CPR mannequins were common training assets and are still in use today. However, many nursing schools have also adopted high fidelity simulators, which are lifelike models of human patients that can be programmed to elicit responses as varied as the subtle gurgles of gastrointestinal sounds to changes in such vital signs as blood pressure and heart rate.

Lewis Professor Dr. Gwen Svoboda recently oversaw a practicum for

four Master of Science in Nursing (MSN) students in the Nursing Education Track that involved designing and implementing two high fidelity simulation exercises. Holly Losurdo, Dalean Seitz-Rumble, Debbie Waggoner, Audrey Zaleski brought theory to practice with their simulation programs that have now been implemented into the college's undergraduate nursing skills laboratories.

"Our simulation exercises are used to bring together the information learned in the classroom with the skills learned in the lab," Svoboda said. "We can design them for some very high-level medical-surgical situations used for critical care or even just to learn basic skills of how to provide hygiene and comfort care for patients."

Simulator models can do everything from cry, sweat, bleed, blink, foam at the mouth, vomit, and moan and groan to making lifelike breathing sounds and can be assessed for heart rate, blood pressure, respiration, and more. One existing simulation scenario created by Lewis University faculty member Kathy McDannel replicates post-partum hemorrhage.

The use of simulators allows student nurses to practice their skills in a safe, controlled environment and prepares them to work in real clinical situations. The exercises also expose the students to situations they may not ever see during their clinical rotations.

"It's the second best thing to actual patient care," Svoboda explained. "It's a great way for students to learn in a safe practice environment."

One of the two scenarios Svoboda's students designed

was a crisis of a pulmonary embolism. The "patient" suddenly was short of breath, developed poor coloring, was anxious, and complained he couldn't breathe.

"It was a quick onset of respiratory distress," Svoboda said. "The students had to respond very, very quickly."

The four established the learning goals, developed a teaching module with content that satisfied accreditation standards and curriculum needs, and ran the exercise with classes of undergraduate students. College of Nursing faculty for the undergraduate classes, Patricia Braida, Jane Trainor, Mary Adams, and Claire Shaughnessy provided guidance with the development and implementation of the project.

The other scenario Svoboda's students designed was a case of congestive heart failure. Symptoms the students created included shortness of breath, edema in the extremities, a venous ulcer in the leg, and distended

carotid arteries in the neck.

The project was truly a team effort, with Lewis University undergraduate and graduate faculty involved, as well as undergraduate and graduate students.

"The chance of each and every student having actually experienced one of these scenarios during their clinical hours is very slim," she added. "Now all of our students will have witnessed and responded to a very important medical situation."

A Study on Transplantation of Pancreatic Cells

for Treatment of Type 1 Diabetes

The exact mechanisms of how and why the human body's immune system occasionally goes awry and begins attacking its own healthy cells is still largely a mystery. The situation is particularly profound in Type 1 diabetes, which strikes mostly children and adolescents causing severe systematic symptoms.

Although there is no cure for the condition, only insulin injection treatment, a Lewis University student under the tutelage of ***Dr. Valerie Vander Vliet****, Chairman and Professor in the Department of Biology, recently undertook an exhaustive study of the cutting-edge field of pancreatic islet cell transplantation that someday could offer a real cure for diabetes.*

Katie Crawford has been fascinated with the field of autoimmune disease ever since her younger brother was diagnosed with juvenile, or Type 1, diabetes. She could see the condition was an extremely difficult one with which to cope and hoped to learn more about it as a biology major at Lewis University.

What she learned in her classes spurred her to devote her senior research paper to exploring the breaking field of transplantation of pancreatic islet cells as a potential cure for diabetes.

She presented her findings at the Celebration of Scholarship event hosted by Lewis University in 2012.

Type 1 diabetes occurs when a person's own antibodies attack and destroy the islets of Langerhans' beta cells in the pancreas. It is there that insulin is produced - the hormone necessary for vital glucose uptake in all cells.

"Without insulin," Crawford reported, "glucose remains in the blood stream, and blood sugar cannot be regulated."

"Our students leave the Biology Department not only with a solid background in biology, but also with excellent written and oral communication skills."

~ Dr. Valerie Vander Vliet

Without proper regulation of blood sugar, diabetic ketoacidosis, neuropathy, high blood pressure and kidney disease can develop. Diabetics are also at a higher risk for cardiovascular disease, stroke, and eye complications.

Monitoring blood sugar levels daily and injecting solutions of insulin is currently the only way Type 1 diabetes is treated.

However, efforts are being made in several research facilities across the globe to transplant pancreatic cells into diabetic patients. Crawford reported that in 2001, scientists at the University of Alberta performed the first successful islet transplantation that resulted in stabilized blood sugar levels. Since then, other labs have shown similar results.

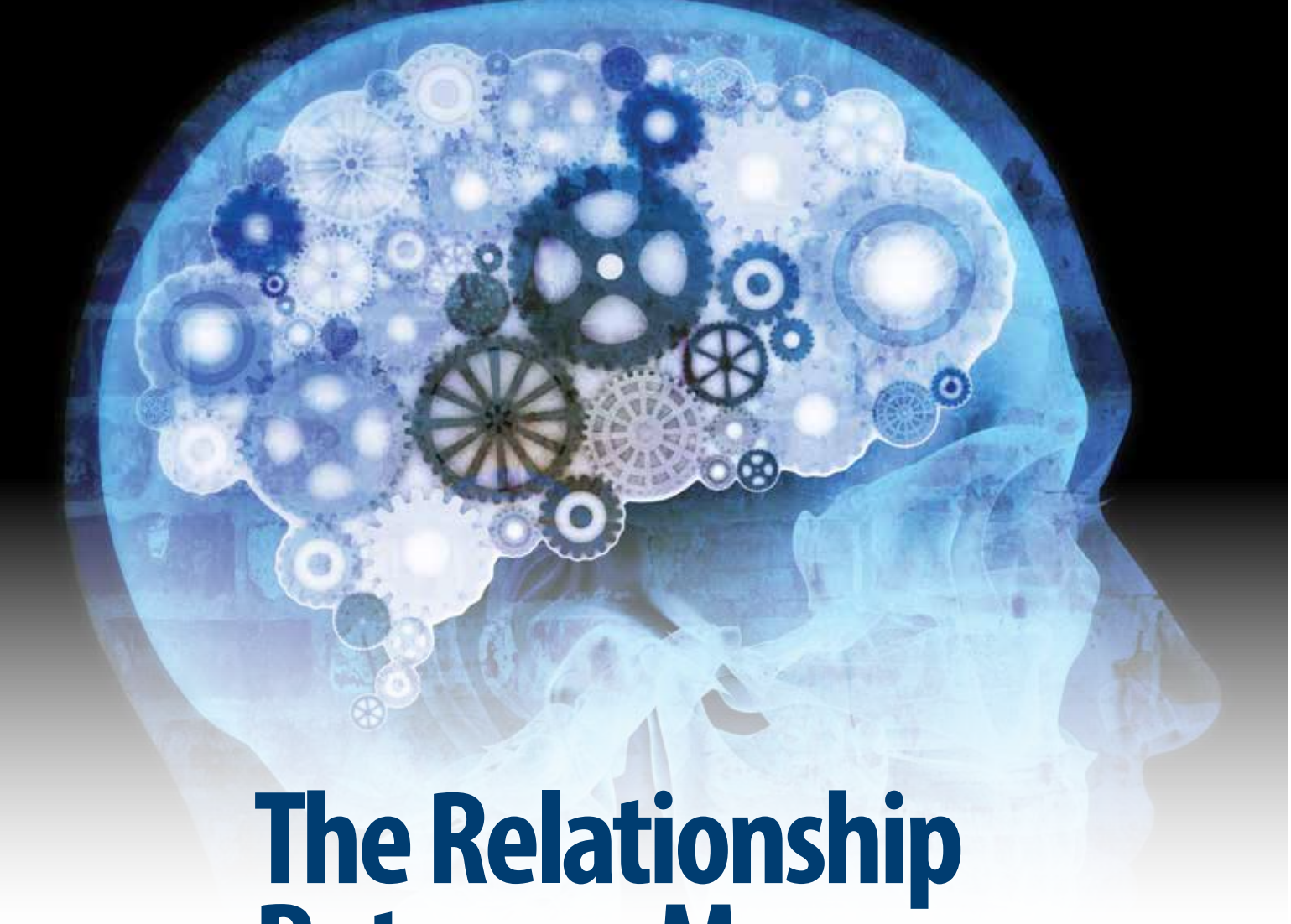
More recently, scientists have found even better success with islet cell encapsulation, a procedure which shields the transplanted cells from autoimmune attacks by the body.

It was a fascinating study, Crawford said, and one that taught her more than just about diabetes.

"I used our online databases extensively," she said, "to find primary sources of research. My professor's specialty is immunology, and she gave me very good feedback on my research. These theories could apply to several other autoimmune diseases, as well as to diabetes."

Dr. Vander Vliet said Lewis University Biology Department senior theses allow students to conduct in-depth studies of a topic through actual lab research or extensive literature reviews.

"In order for students to be successful in the class," Vander Vliet explained, "they must draw upon not only the core concepts and competencies of the biological sciences that they have mastered, but also the higher order evaluative and critical thinking skills that our curriculum demands. Katie Crawford's work was an excellent example of how students rise to this challenge. Our students leave the Biology Department not only with a solid background in biology, but also with excellent written and oral communication skills."



The Relationship Between Memory and Movement

The parietal lobe in the brain is responsible for constructing a spatial coordinate system of our surrounding environment. Located on the top and slightly to the back of the brain, its neurons help us focus attention and give us navigational skills and spatial awareness.

Lewis University Department of Psychology Associate Professor ***Dr. Thomas Bristow's*** *research, in conjunction with the Lewis University Department of Aviation and Transportation Studies, focuses on a method of memory that helps address neural maps in the parietal lobe with the goal of helping pilots improve their cockpit cognitive processing and behavior.*

Airplane pilots face varying degrees of situations of divided attention and multi-tasking with every flight. A pilot must be able to simultaneously control his/her aircraft, plan maneuvers, navigate, communicate with control tower personnel, monitor sensors, and manage other aircraft systems.

Some have found that their memory for location and content improves when they use their fingers to point at cockpit panel numbers and other information.

"The technique seems to reduce pilot error," according to Dr. Bristow. "They have found that when they point to it, they remember what the number was and where it was. This is a relationship between memory and movement that I wanted to substantiate."

Currently in neuropsychology, much research is being conducted on the relationship between cognition and movement. When cognitions and movement correspond to some activity and object, neural maps are created. These neural patterns are necessary for recall of information, vital for a pilot.

"One thing we do know about pilots is that they multi-task," Bristow said. "How well they multi-task during times of duress when things become tense in the cockpit is important to know. To keep mental focus and mental control in times of duress is quite a feat, and the link between movement and memory could be significant. These are cognitive processes that I don't believe have been really explored."

Bristow, with help from Dr. Randy DeMik in Lewis University's Department of Aviation and Transportation Studies, is designing a quantitative research project that will test 40 Lewis University pilots to determine whether memory for location improves when an individual points his/her finger at stimuli, which consists of numbers flashing in various locations on computer screens.

The pilots are randomly assigned to four groups. Each pilot will be seated in front of three computer screens. Each screen will have five blank circles, and each circle will flash only one number. Numbers will flash for one second with one second intervals between numbers until all 15 circles have flashed a number. The number may flash on the screen to the left, right or center of the subject. When the pre-test begins, the subject will quietly sit and observe a number in one of the 15 circles. The subjects will all observe the same sequence and position of the numbers.

Once the sequence is completed, the subject will be given three sheets of paper that replicate the circle designs on each of the computer screens and will be asked to write the numbers they can recall in the appropriate circle.

For the post-test, each of the four groups will be asked to repeat the same test, only the sequence will be different as will the location of the number. The control group performs the same as before. Group 2 will say the numbers aloud as they see them on the screen, while Group 3 will point at the numbers. Group 4 will both say and point at the numbers. The anticipated result is that the finger-pointing group and the group who both verbalizes and finger-points will recall significantly more numbers in their correct positions than the other two groups.

The long-term goal of Bristow's research is to establish a center of neuropsychological study at Lewis University that will focus on improving pilot cognitive and processing behavior.

Research Projects Provide Impetus for

Nursing Students Outside of the Classroom

When registered nurses make the decision to further their education through Lewis University's Master of Science in Nursing (MSN) program, their employers often benefit as much as they do.

*In **Dr. Janice Smith**'s capstone course, students receive the opportunity to collaborate with their own employer healthcare centers on research projects centering on problems nurses encounter in real work situations. And they are using the results to better procedures, foster staff education, and, improve patient treatment.*

Dr. Janice Smith, Professor in the College of Nursing and Health Professions at Lewis University for 18 years and a health professional for 36 years, has seen many changes in the field of nursing. Some of those changes are directly due to educational advances, with nurses taking on more responsibility for enhancing patient care.

Those advances are due to more than classroom learning. Smith's graduate nursing students are working in the field and bring their experiences to their coursework. They have seen firsthand the problems in healthcare settings, and they address those problems in their graduate nursing practicum.

"Their master's capstone project is a synthesis of all their coursework in their program and their professional nursing experience," Smith said. "When they look for a project, they often look for an opportunity to collaborate with one of our educational partners, which many times is their current place of employment. These research projects end up advancing the student, as well as assisting our educational partners. They are really meaningful topics that will have an impact."

Students' research partners are a wide variety of settings including hospitals, parishes, home health organizations, and community health departments.

"We are preparing leaders," Smith said, "and to be leaders they have to be proficient in the language of research. There has always been a gap between research and practice. Academics were conducting the research, but nurses at the bedside weren't reading it. Now we are closing that gap."

Three recent MSN research projects involved collaboration with area hospitals and community agencies.

In one, Lewis MSN students Audrey Wirth, Leigh Anne Piper, and Kathleen Rombach developed educational materials to help nurses assist community members who have not yet prepared for important end-of-life decisions. For those who do not plan for the difficult issues that come up in these situations, friends and loved ones are forced to handle everything during a very emotional time.

Wirth, Piper, and Rombach surveyed 350 adults age 55 and older who were not currently in the healthcare system, asking them whether they had planned for the options that will come during their last days. They specifically wanted to know what the barriers were when those plans were delayed. With those results, the nurses developed a comprehensive program for nurses in the community to address end-of-life planning with the public.

On the heels of that project, another student team consisting of Olivia Lemberger, Amber Davis, and Maureen Lugod developed an algorithm for nurses to use in the emergency room and intensive care units when there is an end-of-life matter.

"Nurses in emergency room and intensive care unit situations are very comfortable using algorithms," Smith explained. "Sometimes nurses have reported that they don't have the right words to say to the families, and the algorithm our nurses developed contains the language they can use in those delicate, but crucial, situations."

Another recent MSN project involved helping healthcare centers understand the barriers nurses encounter when making the decision whether or not to become certified by the American Nurses Association.

"Many hospitals today are aiming for a certain percentage of staff certification," Smith said. "If you have nurses who are certified, the belief is that you have better patient care. Jennifer Quinnert, Jennifer Bak and Sherry Lombardo investigated the barriers to achieving that certification."

The Lewis University MSN graduate program produces nurses who are better able to conduct clinical research, to apply published research results to their own employment situations, and to advance the care of patients in general.

Civic Engagement

Combatting Bullying
Through a Youth Mentoring Program

Lewis University has a long tradition of providing students with opportunities to learn through real world involvement. In ***Dr. Gail Gehrig****'s Applied Sociology class, upper level students take their classroom knowledge out of the classroom and into the community, gaining new perspectives and sometimes even changing lives in the process.*

Although Lewis students spend the majority of their learning hours in the classroom, many professors find that performing research studies outside the university helps their students gain even better insight into their material. In the Applied Sociology class developed and taught by Dr. Gehrig, students discover that teaming up with each other to plan and research a project, then partnering with outside agencies, adds to their educational experience in a number of ways.

Recently, a group of four of Gehrig's students collaborated on a research project that centered on bullying. With heightened awareness of the dangers of bullying in the media of late, the students were interested in gaining a better understanding of the nature of this problem, as well as increasing awareness in the community.

They chose to work with a branch of Big Brothers/Big Sisters that operates out of the Office of University Ministry, serving as interns and mentors in the program. In addition to implementing games and activities with the children, the students also surveyed them regarding bullying issues.

From their results, they were able to prepare and give their "little brothers and sisters" a presentation that offered information about bullying and ways victims of bullying can receive help. The students also presented the results of their work to the community at Lewis University's Celebration of Scholarship held during Founders' Week.

"The students learn a variety of skills through their projects with the community," Gehrig said. "In addition to bettering their sociological and writing abilities, they also learn leadership and how to collaborate with each other and community leaders and residents. They work together as a team, as they will in real life, and many of them are also able to further develop their networking skills."

One of her students opened her own resale shop in a neighboring community after getting to know the needs of that area through her research project.

Other student projects in Gehrig's class have involved working with soup kitchens, food pantries, and gang and violence resistance programs, mentoring college-bound low-income students, raising political interest and voter participation, and assisting the homeless population.

African American Middle Class Roots

Began with Owning Farms

***Dr. Mark Schultz**, Professor of History*

The rush of hope of the bounties of freedom after the Civil War and emancipation were dashed for many black Americans by the harsh reality of bigotry. But those who managed to achieve ownership of their own farmland thrived, even under the most difficult circumstances, eventually laying the foundation bar for the black middle class.

After generations of slavery, freed African Americans discovered the path to meaningful freedom remained elusive. Armed only with the knowledge of agriculture, most desired to own their own farms, but the obstacles they faced were considerable.

Lewis University Department of History Professor Dr. Mark Schultz has made a career of tracking the pathways to landownership of the first two post-Civil War generations of African Americans. And their legacy, he found, is today's black middle class.

"After the Civil War," Schultz said, "agriculture offered the primary route to independence. By 1910, although most African Americans were still sharecroppers, a quarter of them owned their own land. Those landowners had a pride in their work and a stake in their country. In many states, they founded all-black farming settlements, and they grew their own communities based on hard work,

independence, and education."

There were several ways African Americans came into land of their own. Some were bequeathed acreage from their previous slave owners. In Georgia, the wealthiest black farmer owners frequently were kin to white landowners.

In Maryland, a community of white Quaker abolitionists who wanted to see blacks get on their feet and succeed sold farmland to former slaves by offering them long-term loans. The black farm owners would pay as they went.

In Arkansas, black regiments from the Civil War joined together and bought farmland from the railroads, then homesteaded on the frontier.

Schultz said any African American who wanted to own land in middle Georgia needed a white intermediary to vouch for him and then be vetted by the entire white community. Georgia was the least open state to black farm ownership. Only 13 percent of blacks became landowners there, as opposed to 67 percent in Virginia, a state with more liberal traditions on black landownership.

The advantages of owning their own land, as opposed to sharecropping, were tremendous.

"Sharecroppers didn't have control over their crops," Schultz explained. "They didn't get to carry the cotton to the gin, so they didn't know how much was paid for the crop that year. They had to accept whatever the planter said they got."

Sharecroppers' children also were usually seen only as a cheap source of labor, not to be invested in. Black landowners, however, had a stake in educating their children.

"It was in their long-term interest to want their children to be educated," Schultz said. "They saw it as a way to become a better farmer. They could read fertilizer proportions and follow market trends in the newspaper. When World War I began, there was suddenly a huge labor need, and northern industry for the first time turned to black southerners. Those who had an education moved up the ranks and got better pay and more challenging work. That became the foundation for the black middle class."

Children of black farm owners had a strong sense of independence and confidence.

"They knew if their grandparents could make it through the worst years of Jim Crow and still build up a farm that was a sanctuary for their family," Schultz said, "then they could make it in the city or in college. They had faith that they could then take the next step in their lives."

From the northern industrial workers of the 1920s to the Pullman Porters of the 1940s and 50s, to the small business owners and teachers, firefighters, undertakers, and other professions, the modern black middle class grew.

"These fields disproportionately opened up to the descendants of African American farm owners," Schultz said. "I have found in hundreds of interviews that African-Americans who succeeded in urban careers had grown up on farms their parents owned."

Schultz's research is supported by a Collaborative Fellowship from the National Endowment for the Humanities. He and Dr. Adrienne Petty of City University of New York have directed two dozen student researchers to conduct interviews with black farm owners in every southern state. Next year, Schultz and Petty will pull together their findings by writing *Breaking New Ground; African American Farm Owners Since the Civil War.*

Every Move You Make:
A Study on Texting and Domestic Abuse

Nicholls

Tovar

Dr. Tracey Nicholls and Dr. Lynn Tovar, *Associate Professors*

With all the advantages and conveniences of cell phones, texting has become one of the technology's most popular uses. However, two Lewis University professors have discovered a darker side to cell phones. Domestic abusers are using texting as a means to track and assert control over their partners.

This information has spurred the researchers to plan for domestic abuse awareness inclusion in the University's freshman orientation sessions – a potential pilot project for Colleges across the nation.

Most of us know the red flags that signal a relationship could be headed in the direction of domestic abuse – a partner who belittles, is jealous and possessive, controls where the other goes, keeps the other partner away from friends and family, and constantly monitors.

And those behaviors have found the perfect breeding ground in cell phone texting.

Dr. Tracey Nicholls, Associate Professor of Philosophy and co-director of Lewis University's Women's Studies Program, and Dr. Lynn Tovar, Associate Professor of Justice, Law and Public Safety Studies, found that 99 percent of Lewis students use cell phones. Nicholls decided to explore Tovar's hypothesis and they decided that the devices could potentially be one more way abusers could assert control over their partners.

"It's such an innocuous, but pervasive, way to stay connected," Dr. Nicholls said. "But it's also this thing that can be used in such a way that you're never away from your partner. Cell phones and texts have the maximum danger quotient in terms of being an abuse mechanism, but it's the kind of thing people don't recognize yet."

So Nicholls and Tovar teamed up to survey students at Lewis University and women at a Joliet, Ill. domestic abuse shelter to study whether or not text messaging habits can erode into a mechanism to control another's behavior. Their question was, "Has it become another tool for domestic abusers to constantly watch, manipulate and dominate the behavior of their partner?"

Nicholls and Tovar found that 95 percent of the students surveyed use their cell phones to text their partners; 72 percent have never been victims of domestic abuse; 40 percent use their mobiles to check up on a partner at school; and 11 percent said they had been stalked by cell phone.

There were also five respondents who reported to have received death threats via test message.

"That 2012 result was more than double our 2009 findings," Nicholls said. "I think cell phones provide more opportunities for abuse. If a person is inclined to be controlling or abusive, this is their instrument. It's really quite an overwhelming, consolidating way of asserting control. It became very clear to us that this was potentially a very dangerous form of communication."

Nicholls cites an example of one respondent who was receiving so many texts from her boyfriend that she had to delete all messages from her phone at least three times a day to make room for more.

Another woman's partner made her send pictures of her lunch everyday so he could see what she was eating and make sure it was a meal he approved of.

"As benign as most texting is," Nicholls added, "many of our interviewees told us that texting absolutely does not enhance a relationship."

Nicholls said she and Tovar plan on designing domestic abuse awareness programs that can be included in university freshman orientations.

"I think it's important to have some effective awareness education for students," she said. "This potentially could be a pilot project for universities across the nation."

Red flags from text messages that could indicate a partner is a domestic abuser:

- If you find you are in fear of repercussions if you aren't able to respond quickly enough to a text.
- If you know you will have to justify to your partner why you weren't available to respond to a text.
- If you find your moods frequently change to the negative as a result of texts from your partner.
- If your partner sends you an excessive number of texts querying where you are or whom you are with.

Source: Dr. Tracey Nicholls, Department of Philosophy, Lewis University

**This research was sponsored, in part, by the Lewis Scholar Award.*

Economic Impact of Food Pricing

Impacting Global Market

Many financial experts are predicting significant price volatility of wheat, corn, and soybeans in the coming months. That volatility will have a direct effect on food prices. Lower income people living in developing countries are particularly sensitive to changes in food prices, and the human costs can be high. When most or all of a household's disposable income goes toward food, a doubling of the price of corn or wheat can have devastating consequences.

Lewis University Associate Professor of Finance in the College of Business and former new product developer at the Chicago Board of Trade, ***Dr. Frank Rose****, was commissioned by the Food and Agriculture Organization (FAO) of the United Nations recently to conduct research regarding food prices and how they may or may not be influenced by speculators trading in the futures and options markets in the Chicago Board of Trade.*

The question was, what was causing the increase in food prices?

From mid-2010 to mid-2012, corn futures prices doubled, hitting record levels, and prices of other grains are also rising sharply, causing global food prices to increase. In addition to the threat of malnutrition that goes hand-in-hand with higher food prices, the situation could also lead to worldwide inflation and political instability, especially in developing countries.

According to Dr. Rose, part of the cause of the rises is the uncertainty of changing weather patterns, inventories, and plantings, in addition to increasing demand and an instability in the global economy.

"This year," Rose explained, "the drought is a big issue, and growing conditions have been bad in various key parts of the world for several years. In addition to the drought in North America, Australia has had growing issues, and Russia has also had problems. Also playing a role in the increase of world food prices is the growth of demand from China and some governmental actions around the world, such as restrictions imposed on wheat and corn exports from Argentina."

According to Dr. Rose, as Chicago Board of Trade grain prices rose over the past two years, there were a number of changes in the market shares of commercial agriculture firms, swap dealers and money managers in the CBOT's wheat, corn and soybean futures markets.

The Food and Agriculture Organization, which focuses on hunger and food supplies in the developing world, commissioned Rose to evaluate whether the increase in activity of such speculators as swap dealers and money managers is having a causal effect on the increase of food prices. He found, as of now, it is not.

In terms of shares of total long open interest (outstanding market positions on the buy side) in April 2012, commercials, swaps dealers and money managers held 9%, 47% and 29%, respectively, in the case of wheat; 18%, 28% and 32% in corn; and 19%, 21% and 37% in soybeans.

Of the three markets, the 2012 share of money managers in the soybean futures market is perhaps the most notable, by historical standards. The money managers continue to be the participant group to watch. Their current positions are at relatively high levels and, history has shown that abrupt changes in those positions are possible.

"The FAO is watching speculators and looking at all the factors associated with food price rises, trying to figure out what's causing them," Rose explained. "The question is whether the speculators are having an influence. My work shows that there is no definitive causal link there, but that we do need to keep an eye on them because their share of the total activity in the markets is growing."

How Will a Mega Dump Affect an Illinois Community?

Some in the peaceful Illinois town of Cortland were aghast when they learned their elected county officials were considering allowing a mega dump to situate there. It surely would cause a stink, they said, and pollution of the water table, in addition to an increase in traffic and a decrease in property values. Or would it?

Other residents, including the majority of the DeKalb County Board, argued the dump would bring needed tax revenue and business, beneficial in the long run to the education of its students and to the overall quality of life. Lewis University Associate Professor of Business Administration, ***Dr. George Klemic****, has begun a long-term intensive study on the situation to answer the question, "What is the real affect of the placement of a mega dump on a community?"*

Dr. Klemic first learned of the controversy behind the mega dump en route to a fishing trip in DeKalb County when a "Stop the Mega Dump" sign attracted his attention. Back in his office, an extensive literature search showed existing data on the aftermath of several older mega dump sites, but little available with attention to dumps fashioned with contemporary technology, showing the changes in the community over the years.

Klemic realized the DeKalb proposition would offer an ideal opportunity to study the changes experienced in a community relative to property values, sales tax revenues, employment, and housing, along with the potential for sociological and environmental components over time.

"The many questions this study can address include, will the real estate values go up or down?" Klemic said. "What's going to happen to the roads? What will happen with traffic? What will happen to safety issues and to the environment?"

Klemic began the longitudinal research study in 2010, working with a core group of freshman and sophomore students in his Lewis University Principles of Management class. That first year, baseline demographic and statistical data was collected from online federal government sources and from the publically available sources of the DeKalb County Courthouse.

His students obtained information on current unemployment data of the county, population data, property values, household incomes, racial make-up, and taxing information.

"This is a rural area and data suggests that once you get beyond a mile outside the perimeter of a dump, there is no effect on property values."

~ Dr. George Klemic

The second year of the study involved students extracting the same information from two counties with similar demographics in western and in southern Illinois to be used as benchmarking data.

A Lewis University major in Print Journalism also contributed to the early phases of the study by researching the several online blogs that cropped up in opposition to the dump.

Key issues included appeals to the legislative process, public hearings, appeals to the Illinois Environmental Protection Agency, town hall events, and health issues related to the proximity of an elementary school.

In two years, Klemic and his Scholars Academy contract students will take another statistical look at what parameters have changed in the county as a result of the initial establishment of the dump.

Klemic said he expects to see employment and wages increase in the area, as well as service businesses in the vicinity of the site. And although previous research suggests property values drop to around 85 percent of neighboring values with the introduction of a mega dump, Klemic said only hard data will show if that will be the case in DeKalb County.

"This is a rural area," he said, "and data suggests that once you get beyond a mile outside the perimeter of a dump, there is no effect on property values."

In addition to the worthwhile information the results will contribute, Klemic sees the study as an important and relevant way to involve Lewis undergraduates and potentially graduate students in a solid research project that will enhance their development as scholars.

The study that could project out into a 30-year lifespan would involve several classes of students, as well as conceivably the University's undergraduate majors in Sociology and Environmental Science programs.

**The project is funded in part, by the Lowell Stahl Center for Entrepreneurship and Real Estate.*

Celebration of Scholarship

The Lewis University Celebration of Scholarship is an annual symposium to celebrate research, scholarly work and creative endeavors of Lewis students and faculty.

It is a rich opportunity for students to present scholarly work to a student, faculty, and staff audience to celebrate the academic excellence that is central to the Mission of the University. Undergraduate and graduate students in any major may submit posters, present papers at concurrent sessions, and present creative works.

As Lewis University enters its 9th decade, it is fitting that this symposium provides an opportunity to share across the campus the ideas and scholarly work that are shared every day in the classroom. Faculty have long recognized the importance of encouraging our students to participate in and share the knowledge gained through research and scholarship.

This collaborative effort is the work of many departments across the entire University, including the following sponsors:

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One University Parkway
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