

College of  
**HUMAN  
SCIENCES**

# Matters

Winter 2009-2010

Advancing Science · Technology ·  
Engineering · Mathematics (STEM) Education



IOWA STATE UNIVERSITY

Toddlers learn  
STEM

Teachers shape  
STEM mind-sets

Alums thrive in  
STEM careers



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*Dean Pamela White*

**Making STEM education sySTEMic**

Dear Alumni and Friends,

The sneakers you laced up for your morning run, the oatmeal you ate for breakfast, the economic forecast you saw in the news, and the vehicle that transported you to work were all brought to you by science, technology, engineering, and mathematics (STEM) professionals.

From improving health and protecting national security to cultivating greener energy, advances in STEM ensure our well-being. Developing our youth into STEM problem-solvers is critical to our future. Whether they emerge as architects, teachers, dietitians, cosmetologists, or automotive technologists, those with a solid understanding of STEM will lead more fulfilled lives – and effect more positive change. We promote STEM literacy to realize a world of wise, inquisitive, logical thinkers who promote discovery, cooperation, and prosperity for all.

Iowa State enjoys an uncommon spirit of collaboration across the STEM and education fields. Despite the challenging economic climate, we maintain a steadfast commitment to STEM education. The College of Human Sciences is redoubling its already-robust efforts to strengthen STEM education across the entire university.

STEM education is not limited to universities. Tomorrow’s breakthrough will come from today’s student. College students are better prepared for higher STEM learning if they have experienced appropriate, effective learning activities as infants, toddlers, and schoolchildren.

As you traverse this issue, you will find that STEM education is ingrained in most every College of Human Sciences effort.

We recently hired Barbara Dougherty to reinvigorate the Center for Excellence in Science, Mathematics, and Engineering Education. The recent alignment of Youth 4-H Development and the College of Human Sciences offers opportunities for further advancements. As teachers polish effective strategies and students learn through inventive courses, alumni tap their STEM skills to improve people’s lives.

We take pride in these achievements, thank you for your support, and march forward in the campaign to sharpen STEM education.

Sincerely,

Pamela J. White

Dean

# College of Human Sciences, 4-H Youth Development align

By Cathy Curtis

4-H is the nation's largest youth development organization, through which more than six million young people across America learn leadership, citizenship, communication, and life skills. One quarter of Iowa's young people are involved in 4-H. In Iowa, 4-H Youth Development is headquartered at the Iowa State University campus in Ames.

Now, for the first time ever at Iowa State, 4-H Youth Development has an academic home – and that home is the College of Human Sciences. The strategic alignment is designed to leverage both the power of the college's expertise in youth education, human development, and STEM education as well as the strengths of the 4-H program's deeply rooted, community-based outreach.



## 4-H youth experiment with biofuel

With a plastic bottle, some corn syrup, a little yeast and a balloon, budding scientists observed how yeast breaks down sugar to yield energy, while releasing carbon dioxide and ethanol – a biofuel, as part of Biofuel Blast, the 2009 National Science Experiment, in October.

Through experimentation, hundreds of Iowa 4-H youth learned how cellulose and sugars in plants – such as corn, switchgrass, sorghum, and algae – can be converted into fuel.

The youngsters also learned about alternative energies, how they can be applied in their own communities – and the need to develop new technologies and decrease dependence on fossil fuels.

Local 4-H clubs gathered the materials and made arrangements to conduct the experiment to highlight 4-H National Youth Science Day. Some ran the experiment during their regular club meetings; others arranged demonstrations at their local schools and shared the experiment with their classmates.

Iowa youth have enrolled in 14,500 4-H science, engineering, and technology projects over the past year. Through the One Million New Scientists, One Million New Ideas campaign, 4-H leaders nationwide plan to engage one million new young people in science, engineering, and technology programs by the year 2013.

It's a reachable goal, noted Keli Tallman, who leads program evaluation and research for ISU Extension 4-H Youth Development. According to a longitudinal study by Tufts University, Tallman said, youth who participate in 4-H are more likely to get better grades in school, to seek out science classes, to see themselves going to college, and to contribute positively in their communities. In addition, 4-H youth have been shown to better resist peer pressure and are less likely to engage in risky behaviors.



For information about joining 4-H, visit the recently redesigned web site at [www.extension.iastate.edu/4H](http://www.extension.iastate.edu/4H)

**On the cover:** STEM education is in full force and gaining even more steam in the College of Human Sciences. Clockwise from top left, recent science education graduate Dan Nguyen concocts chemical formulas; John Nash, associate professor in educational leadership and policy studies, explores instructional technology in the C6 virtual reality chamber; middle school student Ana Correia works through an algebra equation; toddler Reagan Hanfelt develops pre-engineering skills while building structures.

**College of Human Sciences Matters** is a magazine for alumni and friends of the Iowa State University College of Human Sciences (CHS).

A scientific survey has suggested that alumni and friends prefer to read print editions of the magazine. If you prefer not to receive CHS mailings, please drop us a line at the address below.

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*Michelle Harris, a fifth grade teacher at Anita Elementary, has been honored with the (U.S.) President's Award for Excellence in Science and Mathematics Teaching, for successfully implementing the Science Writing Heuristic in her classroom.*

## Harris receives math, science award

By Laura Dillavou

Six years ago, Michelle Harris was in a situation common amongst young educators: She knew she had to teach science concepts to her fifth grade students, but fear and uneasiness with the subject matter left her less than thrilled to start a science unit.

But that changed when she agreed to participate in Iowa State University's Iowa Science Writing Heuristic (SWH) project. Developed and implemented by former Iowa State curriculum and instruction faculty members Brian Hand and Lori Norton-Meier, the SWH teaches educators to integrate concepts of creative thinking, writing, and literacy to expand their students' knowledge and comprehension of science.

Today, Harris, a teacher at Anita Elementary in Anita, is known not only throughout the school district for her innovative teaching methods, but on a national level as well. In January, she received the Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) from the White House Office of Science and Technology Policy and the National Science Foundation.

Kim Wise, Area Education Agency 13 science consultant, nominated Harris for the award after seeing her classroom come alive through SWH.

"Michelle has created a very student-centered environment that values student's understanding," Wise said. "It is amazing to hear the confidence in students' voices, whether they are trying to back a claim with evidence or challenge a peer on his or her investigative design. The kids would tell you they love science and love learning. It's an exciting thing to witness."

## STEM education reaches full bloom

By Laura Dillavou

STEM education – the teaching of science, technology, engineering, and mathematics – affects most aspects of everyday life. Researchers in the College of Human Sciences are developing holistic STEM education programs, outreach activities, and innovative teaching methods to educate everyone from instructors to the students they teach.



### Establishing the roots

What's the best way to teach young minds math concepts? The SIMPLE way, of course.

SIMPLE – or Strengthening Iowa Mathematics Preschool Learning Environments – is helping early childhood educators learn research-proven strategies to expand the number and depth of mathematics concepts they teach to youngsters. Through the SIMPLE method, teachers use math frames, or open-ended activity frameworks, that incorporate games, songs, books, and storytelling, into activities that link math content and math processes.

"We know that at that age, young students show an intuitive grasp of math concepts – so we need to build on that and enhance their ability to problem solve and

use critical thinking skills now and later in their schooling," said Carla Peterson, associate dean for research and graduate education and professor in human development and family studies.

By implementing and piloting the math frame activities on campus, researchers see firsthand the effects they have on educators and students alike. Peterson said SIMPLE is a small investment for early childhood programs that results in a big payoff for students later in life.

### Growing the cause

Science teachers across Iowa are learning to combine multiple academic disciplines into one through the Iowa Science Literacy Project and its main component, the Iowa Science Writing Heuristic (SWH). Developed by former Iowa State University curriculum and instruction faculty members Brian Hand and Lori Norton-Meier, the SWH approach uses creative thinking, writing, and literacy to expand students' knowledge and comprehension of science.

The SWH approach maintains that students discover scientific wonders using their natural inquiry – asking beginning questions, learning to make claims, providing supporting evidence, presenting and arguing the meaning of the findings, and reflecting on how their thinking has changed. The hands-on discovery process puts students in control and allows teachers to learn with them.

"We want to help kids think with the mind of a scientist," Norton-Meier said. "It's interesting that when we rethink the way we teach science, we learn there is no science without language – teachers need to incorporate the values of language and literacy practices into science."



### **Weeding out the gatekeepers**

According to Anne Foegen, associate professor in curriculum and instruction, students' success in algebra is critical to their future success.

"Algebra often serves a gatekeeper function," Foegen said. "For many students, it's the point where they get stuck – if students can't get through algebra, they're going to struggle in the advanced mathematics that are needed to get a college degree and have been linked to higher-paying jobs."

Foegen is breaking down algebra barriers through a line of research investigating the development and application of brief assessments teachers can use to track their students' achievement in algebra. Her work currently focuses on creating online professional development workshops so teachers nationwide can receive instruction more efficiently. Researchers will also develop online tools that teachers can use to monitor students' progress and develop more effective instructional methods.

### **Flourishing in new terrain**

STEM education doesn't stop after high school. As more jobs are created in STEM fields, students must be prepared with a battery of STEM skills.

Faculty in educational leadership and policy studies (ELPS) are examining the acquisition and teaching of STEM skills from all sides of the issue.

Frankie Santos Laanan, associate professor in ELPS, has focused his attention on the transfer function of community colleges to prepare pre-STEM majors in the first two-years of general education prior to transferring to a four-year college or university. "Pathway to a STEM baccalaureate degree," was a two-year project funded by the National Science Foundation.



"What we've done in the Pathways project is create a collection of products for students, faculty, and advisors to introduce them to the possibilities of transferring to a four-year institution with their pre-STEM major," Laanan said.

Meanwhile, Larry Ebbers, university professor in ELPS, is working with the Iowa Mathematics and Science Education Partnership to address the shortages of math and science instructors at community colleges by launching a special STEM learning and teaching community college teaching certificate program.

Professional development opportunities prepare community college faculty – particularly those in STEM-related fields – to approach teaching with a newfound



knowledge for the future of science- and technology-related careers.

"We know that community colleges will play a major role in the pipeline of transfer and preparation of students," Ebbers said. "Our program to prepare teachers in the community college STEM fields is essential to student success."

### **Cultivating the field of opportunities**

Looming large on the horizon of education, policy, and employment, STEM has a presence that cannot be ignored – and Iowa State is preparing graduates to successfully enter a variety of industries, well-equipped with critical skills in the areas of science, technology, engineering, and mathematics. What's more, College of Human Science educators are taking a holistic approach to STEM education.

"We're committed to the scholarly research, but also using that research to inform policy and practice within our schools," Laanan said. "From early childhood to the college president, we're connecting people, ideas, and practices that will result in student success."

## Honors and awards

Iowa State's hotel, restaurant, and institution management program is ranked 15th amongst the world's top 100 hospitality and tourism programs, according to the Nov. 2009 issue of the *Journal of Hospitality and Tourism Research*.

**Barbara Dougherty**, professor in curriculum and instruction and director of the Center for Excellence in Science, Mathematics, and Engineering Education, has been named a member of the Iowa Academy of Education.

**Ann Marie Fiore**, professor in apparel, educational studies, and hospitality management, was named a fellow of the International Textiles and Apparel Association (ITAA).

**Frankie Santos Laanan**, associate professor in educational leadership and policy studies, has been named president of the Association of Career and Technical Education.

**Sara Marcketti**, assistant professor in apparel, educational studies, and hospitality management, received the "Rising Star Award" by the ITAA for outstanding contributions and research as a junior faculty member.

**Grandmaster Yong Chin Pak**, a senior lecturer in kinesiology and martial arts instructor, was named one of the 150 most influential leaders in taekwondo worldwide by the South Korean government.

**Lori Patton**, assistant professor in educational leadership and policy studies, has been named a 2009 Institute Fellow of the Association for the Study of Higher Education. Patton is developing a program with other educators from across the country to help create equity-minded racial justice educators for student affairs.

**Mary Yearns**, professor in human development and family studies and housing specialist in Families Extension, received the Board of Human Sciences National Award for Outstanding Engagement.

**Eunjoo Cho**, doctoral candidate, and **Ashley Ratute**, master's candidate, received the Sara Douglas Professional Promise Fellowship from the ITAA

**Ui-Jeen Yu** (MS '01 TC, PhD '09) received the Lois Dickey Fellowship from the ITAA.

## Dougherty, CESMEE advance STEM ed

By Cathy Curtis

American ingenuity is the lifeblood of our economy and a source of national pride. From assembly lines and airplanes to vaccines and social media, life-changing creations have streamed from Uncle Sam's innovators. Forecasters worry, however, that the flow may slow to a trickle.

In an ever more high-tech world, tomorrow's inventor will need more than opportunistic flair – she'll need a solid knowledge base in science, technology, engineering, and mathematics. Yet when it comes to STEM education, our kids aren't keeping up. According to a recent report by the STEM Education Coalition, the number of U.S. bachelor's degrees in STEM fields has flattened out recently.

That's where Barbara Dougherty steps in. Dougherty is breathing new life into STEM education – and putting it on steroids. Dougherty, professor in curriculum and instruction and director of the Center for Excellence in Science, Mathematics, and Engineering Education (CESMEE), is passionate about STEM. And she's even more zealous about kids and education. Together with a cadre of like-minded colleagues, Dougherty is reinventing, reinvigorating, and ramping up STEM education.

As a board member of the National Council of Teachers of Mathematics, Dougherty helps recommend what should be taught in the country's mathematics classrooms. She is even better known for formulating an effective approach to teaching children math from a measurement perspective.

"Our research team has some very innovative ideas that cause people

to think about math and science in ways that they haven't ever thought of before," Dougherty said.

CESMEE has joined forces with leaders from Iowa's other public universities, through the Iowa Mathematics and Science Education Partnership, to reclaim the state's standing as an international leader in mathematics and science education.

According to Dougherty, you start growing STEM-minded students by first producing more outstanding STEM educators. CESMEE works with professional educators to improve classroom learning for everyone from infants to doctoral students.

To recruit more STEM-minded college students into the teaching profession, CESMEE offers I-Teach, a one-credit course in which STEM majors at Iowa State explore instructional strategies, visit active classrooms, and interview experienced teachers.

The center hosts the nation's foremost experts to speak in seminars that challenge Iowa State professors and other educators to rethink the way they teach. CESMEE's affiliated faculty is working to offer strong curriculum for STEM.

"Everything we do has an underlying research-based foundation," Dougherty said.

Iowa State is a powerful magnet for those who seek excellence in STEM and STEM education.

"I was attracted to this campus by the way in which the faculty collaborates," Dougherty said.

"The seriousness with which they approach the issues with STEM education, the way they problem solve, the commitment, the constant reflection on their own practice – it's actually pretty amazing."

## Greater focus on teacher preparation needed to produce outstanding STEM educators, learners

By Michelle Rydell

While developing students skilled in science, technology, engineering, and mathematics (STEM) fields has become a priority for many schools, education experts from Iowa State University say that before schools can start producing outstanding STEM students, they must focus more on science teacher preparation and development.

This emphasis on changing the way science teachers are taught reflects the learning philosophy of Iowa State alum Mark Windschitl, ('79 zoology, MS '92 ed. research and evaluation, PhD '95 curriculum and instruction), who now serves as associate professor and chair of curriculum and instruction at the University of Washington. He credits his education at Iowa State for demonstrating the importance of student learning.

As a former secondary science teacher in Des Moines, Windschitl said he was surprised to find that students whom he thought had learning difficulties actually learned easily in other environments where the student was engaged. His observations sparked an interest in training other teachers to understand how students learn best.

"The quality of teaching in the classroom is more influential than a number of other factors, including curriculum, type of school, parental background, and even socioeconomic status," Windschitl said. "Teaching is more important than any of those, and well-trained teachers are an absolute priority in this country."

Through his research, Windschitl concluded that future teachers learn by engaging in classroom experiences, and become much



*EunJin Bang, an assistant professor in curriculum and instruction, interacts with education majors during class. Bang says inquiry-based learning is one of the leading methods for teaching STEM concepts. Photo by Jaelyn Hansel.*

better STEM educators when they participate in hands-on learning activities, rather than emulating other teachers' behaviors. His studies in teacher development have resulted in the creation of an online toolbox tailored just for beginning science teachers, which can be found at [Tools4TeachingScience.org](http://Tools4TeachingScience.org).

EunJin Bang, assistant professor in curriculum and instruction at Iowa State, says it's not surprising that future teachers learn best in hands-on learning environments. Bang points to inquiry-based learning as one of the leading methods for teaching STEM concepts, and says it is important for teachers to remember that engaging classrooms function better than textbook-focused teaching.

"Researchers know that inquiry-based learning, or science by doing, really works," Bang said. "It lasts a lifetime and is meaningful. This is important, because research shows that early exposure to meaningful math and science learning has a great impact on students choosing STEM careers."

Challenges for future STEM educators go well beyond the undergraduate teacher education years, however. Part of the difficulty comes from nurturing confident, enthusiastic teachers during their first year on the job.

"If you only look at teacher preparation, you miss a lot of what

teachers can learn to do in their first year (induction year) of work," Windschitl said. "Induction year seems to be more important than we thought before. That is a point at which teachers are willing to try ambitious forms of pedagogy and they are able to work with mentors and get feedback from them."

Bang says the absence of proper induction programs for beginning teachers results in frustration and high burnout rates. The continuity of induction programs, as well as ongoing mentoring opportunities, is directly linked to teacher achievement – and policymakers need to funnel sufficient resources to support these efforts, Bang said.

"The first five years are the most critical years, because beginning teachers are still malleable," she said. "Their practices still have a lot of room to change. They are still exploring, still unsure, and practicing their science with ambiguity."

"The way the schools are set up, the context impacts the practice," she continued. "That's why it's so important that school administrators emphasize to teachers how important it is to teach science through inquiry, to create a meaningful learning experience for students, so that they might perceive science as their vocation."

## Nguyen uses past to shape future

By Laura Dillavou

On his first attempt to get into the Iowa State University Teacher Education Program, Dan Nguyen failed. Fueled by life experiences that challenged his determination, Nguyen studied harder, focused his attention, and passed. Today, he considers it one of his greatest accomplishments.

Nguyen, a recent graduate in secondary education with an endorsement in math, recently finished student teaching at Lincoln High School in Des Moines. Located on the city's south side, it is home to one of Des Moines public schools' most diverse student bodies. For Nguyen, that's exactly what he was looking for.

"Everybody told me, 'Don't go there, you won't like it,'" Nguyen said. "But I can relate to these students. They come to school, each with a different story – something that is affecting their lives and even their ability to learn – and I know what that feels like."

Nguyen, originally from Vietnam, moved to the United States when he was 14, under a protection status. Lacking a strong educational background, he entered school with little understanding of the English language and worked with the Upward Bound program to get on track to enroll at Iowa State.

Two weeks into life at Iowa State, Nguyen received a call to serve on a military mission to Kosovo. One year later, he returned to college and began working toward a degree in engineering. Not sensing a fit, he consulted with his Upward Bound mentor and realized that just as she had influenced his life, he wanted to do the same for other students.

"I feel like the United States did so much for me and my family and I want to return the favor by working



*Dan Nguyen, a recent graduate of the College of Human Sciences, came to the United States at age 14 with little knowledge of the English language. Today, he is a young math teacher, using his own life experiences to improve students' lives and understanding of math. Photo by Jaclyn Hansel.*

in our schools, helping kids become better students," Nguyen said. "I see myself as more than a math teacher – I'm a role model and someone who truly cares about them."

As for his teaching style, Nguyen describes it as a combination of math and life skills. Utilizing a story-telling method, Nguyen engages students with real-life happenings and activities that tie learning and growing together.

"There will always be the students that don't care, no matter what you do," Nguyen said. "And when they don't put effort into things, I am disappointed. But I also saw that some students were able to relate to the lessons I planned and the things I taught them, and that's enough for me. The math comes easy [to me], but really understanding how to best teach each student is a challenge and very rewarding."

Nguyen said he will stay in Iowa and begin the search for a full-time teaching position.

"I want to be in a school like Lincoln, where I can utilize my student teaching experiences and build upon the skills and methods I learned at Iowa State," Nguyen said. "I have the ability to relate to these students and they need someone like that in their life."

### ISU grads play key role in Texas school's success

A commitment from educators to turn the low-income, inner-city environment of the Aldine Independent School District (Aldine ISD) into an award-winning student body didn't happen overnight. But eventually, it did happen – and Iowa State University teacher education graduates played a major role in that success.

In September, U.S. Secretary of Education Arne Duncan announced Aldine ISD (Houston, Texas) as the winner of the 2009 Broad Prize for Urban Education – the largest education award for school districts in the country. The prize is designed to reward districts that improve achievement levels of disadvantaged students. As the winner of the Broad Prize, Aldine ISD will receive \$1 million in college scholarships for graduating seniors next spring.

Scott Corrick ('95 elementary education) is the curriculum and instruction assistant principal at an Aldine ninth-grade school.

"This award tells everyone else we're an urban school district that has some outstanding potential – and to the administrators and educators, it's a pretty good indicator that we're doing something right, and we have many Iowa State teachers to credit for that."

To read the full story on the success of the Aldine school district and ISU's integral involvement in their achievements, visit [www.hs.iastate.edu](http://www.hs.iastate.edu).



# Alum professionals advance STEM around the world

For years, College of Human Sciences alum have been using their foundations in science, technology, engineering, and mathematics (STEM) education to make a difference in the lives of others.

The next few stories provide a glimpse into careers, discoveries, and initiatives to infuse STEM elements into our community, medical treatments,

and schools. These alum are but a few of the many who use their skills to further progress the development of strong students and thriving communities.

The importance of STEM education goes beyond a degree. As evidenced by our nation's president, science, technology, engineering, and mathematics education is the ticket to creating world-

class schools and preparing students to successfully land global jobs in these increasingly important fields.

From South Korea to the cornfields of Iowa, college alums are relying on an array of skills and practices learned at Iowa State University to make breakthroughs in the way we incorporate elements of STEM education in our everyday lives.

## Haberl guides state disaster preparation, response

By Laura Dillavou

It was Sept. 1, 2001, when Jami Haberl started her new job at the Iowa Department of Public Health (IDPH). Little did she know that within two weeks, her career would take a new focus and lead her to a position directing the state's disaster preparedness plans for public health.

"September 11 happened just two weeks after I started my job," said Haberl, a 2000 graduate in community health education (now kinesiology and health). "Right away, we realized there was a huge gap in the understanding of bioterrorism attacks, such as the anthrax scares."

While at Iowa State University,

Haberl took a number of electives in chemistry, biology, mathematics, and statistics. More recently, she received master's degrees in public health and health care administration from Des Moines University.

"At the time, I wondered why I was taking all these tough classes in math and science," Haberl said. "When I started working at the IDPH, I realized my background and training in science, math, and technology were critical in breaking down the scientific terminology so people could actually understand what they needed to be aware of."

Now, as the executive director for the Safeguard Iowa partnership, Haberl is again at the helm of state disaster preparedness planning. She is leading teams of health, business, environment, safety, and science experts in the creation of plans to keep Iowans safe amidst

incidents from the floods of 2008 to H1N1 outbreaks.

"Because of my background in science, math, and technology, I understand and can implement the scientific information in a way that the public will comprehend," Haberl said.



*Jami Haberl ('00 CHE) relies on science, math, and technology skills in her role as executive director of the Safeguard Iowa Partnership, a non-profit organization dedicated to strengthening the prevention, preparation, response, and recovery from disasters in Iowa communities. Photo by Laura Dillavou.*

# College alums, faculty make breakthroughs

## Alum, researcher Alberts makes moving discovery during RAGBRAI

By Laura Dillavou

Growing up, Jay Alberts thought The Register's Annual Great Bicycle Ride Across Iowa (RAGBRAI) was silly. After all, why would anyone want to ride a bike hundreds of miles through Iowa?

Twenty years later, Alberts credits the week-long event as a turning point in his research career. Alberts, who graduated from Iowa State University in 1994 with a degree in kinesiology, has used RAGBRAI to observe the effects of forced exercise to improve the motor function of people with Parkinson's disease.

As an undergraduate, Alberts was interested in motor control and neuroscience, specifically focusing on how Parkinson's disease impacted motor functioning. Today, he works in biomedical engineering at the Cleveland Clinic's Lerner Research Institute. He is considered an expert in deep brain stimulation (DBS), as it relates to its effect on motor and cognitive-motor function in Parkinson's patients.

However, he was far removed from the lab when he made a big discovery; amid cornfields and ice cream, Alberts saw the power of pedaling before his eyes.

"It was RAGBRAI 2003 and I was riding with a good friend and his wife, who has Parkinson's," Alberts said. "After the first day, they decided they didn't want to ride tandem

*Jay Alberts ('94 kinesiology), right, and colleague David Heydrich ride with team Pedaling for Parkinson's during RAGBRAI. While wheeling across Iowa, Alberts made startling discoveries linking bicycling on the back of a two-seater to the improvement of brain function in people like Heydrich, who has Parkinson's disease. Contributed photo.*

[together], so I rode with her. Two things happened: Her handwriting became remarkably legible and she said that for that week, while riding, she felt like she didn't have Parkinson's disease. It was great, but I didn't really think too much of it, as it was difficult to know what might be causing these improvements."

Two years later, a similar event led Alberts to think the relationship between tandem bicycling and improved motor control was more than a coincidence.

"In 2005, I rode RAGBRAI tandem with a colleague, Dr. David Heydrich, who also has Parkinson's disease, and uses DBS for the treatment of it," Alberts said. "Before we left on the ride one day, he turned his DBS system off; as expected his tremors and other symptoms returned rapidly. Fifteen miles into the ride when we stopped for a doughnut, his tremors had disappeared. For the rest of the ride that day, he was asymptomatic. That experience led me to investigate the link between exercise and Parkinson's further."

Alberts looked to the animal literature and found that forced exercise had

been used successfully in rodent models of Parkinson's to improve motor function and alter brain structure and function. In these studies, animals were forced to exercise at relatively high exertions, or speeds and intensities higher than they would on their own. In essence, Parkinson's patients pedaling in tandem with Alberts were also exercising at a higher rate than they could on their own. Alberts called it a "serendipitous" finding.

"I talk about this with the skeptics and tell them, 'No, we didn't discover this in the lab. We found it as we were pedaling through the cornfields of Iowa,'" Alberts said. "This is a behavioral intervention with no negative side effects, assuming the individual is able to exercise. The most encouraging aspect of this finding is that we may be actually treating the disease itself, instead of just the symptoms. That's something no drug or procedure has shown. Translation research is typically thought of as taking discoveries from the bench to the bedside; in this case, it was from the cornfields to the bedside."



# in STEM-related careers



At right, Toni Wang, associate professor of food science and human nutrition, meets with her mentor, Faye Dong, professor and department chair in food science and human nutrition at the University of Illinois. Wang is a participant in the ISU ADVANCE Scholar Program. Contributed photo.

## Hamrick helps STEM women faculty of color advance their careers

By Laura Dillavou

Flo Hamrick, associate professor in educational leadership and policy studies, along with a team of accomplished faculty members at Iowa State University, are providing young minority faculty in STEM fields enriched opportunities to connect, learn, and grow in their new positions.

As part of ISU ADVANCE, Hamrick leads the ISU ADVANCE Scholar Program, designed to enhance the recruitment, retention, and advancement of women faculty of color in STEM disciplines. The objective is to facilitate networking, collaborative, and mentoring relationships between ISU STEM women faculty of color and eminent scholars in their respective disciplines or fields.

“It’s been very rewarding to see the progress of the ADVANCE Scholar Program since it began in 2006,” Hamrick said. “Creating these reciprocal visits has resulted in research collaborations, increased networking, and opportunities for Iowa State faculty to learn from and partner with premier scholars in their area of research.”

But why is so much importance placed on developing STEM faculty? Hamrick, who has researched higher education equity and access for members of underrepresented groups, said that women faculty members entering academic careers in STEM fields are often less likely to experience the kinds of mentoring and sponsorship that highlights their research accomplishments, expertise, and promise.

“For example, in some studies, although male and female graduate students and postdocs were similarly situated with respect to qualifications and intellectual capital, men were more likely to represent the labs as conference and research symposium presenters. So men have tended to receive more of this early exposure that fosters their making contacts with fellow academic researchers and prospective collaborators.”

The ISU ADVANCE program is a five-year effort funded by the National Science Foundation’s ADVANCE program.

*For more information on ISU ADVANCE, visit [www.advance.iastate.edu](http://www.advance.iastate.edu).*

## Explore the science of culinary creations during the ‘Enhance Your Iowa Plate’ conference

Take a culinary tour of Iowa during the first annual “Enhance Your Iowa Plate” conference, June 10-11, 2010, at the Iowa State University campus in Ames.

Participants will have opportunities to work in Iowa State kitchens and receive instruction from professionally-trained chefs while also practicing proper food safety and cooking techniques, refining knife skills, and learning new food preparation methods. The two-day conference will culminate with a picnic of fresh Iowa foods prepared by participants.

“Today’s dietitians and educators are more interested than ever in expanding their culinary skills, while staying up to date on the latest health and nutrition trends,” said Jean Anderson, senior clinician in food science and human nutrition at Iowa State. “This workshop allows us to blend two key areas of interest: nutrition and food. Participants will learn new tricks to provide quick, nutritious, tasty meals for family and friends.”

To learn more about the conference – including online registration, daily itineraries, and contact information – visit [www.fshn.hs.iastate.edu/plate](http://www.fshn.hs.iastate.edu/plate). Registered dietitians can receive 12 continuing professional education units by attending the conference. All participants will receive a certificate of completion and a collection of recipes.



Laura Hanson (left), who earned a bachelor's degree in dietetics in 2002 and a master's in nutrition in 2004, both from Iowa State University, reviews specimen collection requirements with a patient for a clinical trial. Hanson helps manage clinical trial projects at the Mayo Clinic in Rochester, Minn. Photo contributed by Mayo Clinic.

## Hanson uses STEM skills in new career managing clinical trials

By Michelle Rydell

Although she didn't know it at the time, the comprehensive science, technology, engineering, and mathematics (STEM) education Laura Hanson received at Iowa State University was crucial to landing a job at the Mayo Clinic in Rochester, Minn.

Hanson, who received her bachelor's degree in dietetics 2002 and master's degree in nutrition 2004, said the STEM education elements infused throughout her education presented her with career opportunities she didn't even know existed.

"You absolutely need to have a science background in this field," Hanson

said. "You have to be able to follow the logic of research and understand the clinical world. It was so important for me to get a degree in a science-related field so I could get off on the right foot and launch my career."

As an associate clinical trial project manager, Hanson works in a central research unit that interacts with physicians from all functional areas. She is currently focused on validating new biomarkers to better diagnose and improve treatment for disease.

Thanks to the STEM education she acquired at Iowa State, Hanson says she looks forward to making a difference in patients' lives every day.

"It's a very benevolent field," Hanson said. "You're not trying to sell anything to anyone or convince anyone to do anything they don't want to do. You're just hoping to do something to make things better and improve people's lives."

## Dunek taps STEM, education degrees to advance workforce

By Laura Dillavou

Raised in a family of engineers and born with a natural aptitude for math and science, Susan Dunek found engineering to be a natural career choice. Today, she still considers herself an engineer – building strong businesses and STEM-skilled employees to improve the state of Iowa.

Dunek, an educational leadership and policy studies graduate student, has run the gamut of corporate America. As a project engineer, she managed projects for some of the country's larger companies, including General Motors and the NutraSweet division of Monsanto. Years later she shifted gears to focus her science, technological,

engineering, and mathematics (STEM) skills on preparing others for successful STEM-related careers.

Today, Dunek serves as the managing consultant for the Center for Business and Industry Services at Southeastern Community College in West Burlington, Iowa.

"In Iowa, it is critical that we focus on skill development for people already in the workforce," Dunek said. "By providing training and professional development, our state remains competitive and employees become better workers. Having been on the private sector side, and now on the education side, I have the ability to understand where both are coming from, and where they need to go to be successful."

Dunek said it's no secret that community colleges – and their close ties to STEM education efforts – will play an important role in preparing competent employees for a variety of careers.

"So many community colleges are able to keep an occupational thread connected to the learning," Dunek said. "In STEM-related careers, students know they will encounter these situations in the workforce – not just in the classroom. STEM education and training is a critical piece to our country's economic well-being. It's a challenge, but also a very exciting time to be in higher education."



Susan Dunek. Contributed photo.

## Iowa State alums revolutionize Korean education through alternative school

By Michelle Rydell

After years of coaching some of South Korea's largest corporations and introducing the idea of servant leadership to the corporate community, two Iowa State University alums are extending their educational efforts to children in an attempt to create future global leaders.

MiOk Cho and Kwan Eung Lee, a husband-wife team, are internationally recognized for their achievements in management consulting, training design, and leadership training for corporate leaders. Now, they are hoping to revolutionize education among Korean children through a new alternative school located at the Torisberry Kids Leadership Center.

The leadership center school is named the "Ann Thompson Academy," commemorating Ann Thompson, professor in curriculum and instruction at Iowa State, who taught and inspired Cho. The auditorium is also dedicated to Thompson.

Torisberry, which was developed in 2007, is the realization of a vision conceived while attending Iowa State, said Lee (MS '85 professional studies in education, PhD '89). The couple dreamed they would dedicate themselves to improving education and helping people increase their self-esteem and self-awareness through leadership training.

"We witnessed that when students had new awareness on social issues, they began to show different attitudes



*From left, training program designer and leadership development consultant Kwan Eung Lee (MS '85 professional studies in education), visits with Anne Foegen and Eunjin Bang, faculty members in curriculum and instruction in South Korea. The trio stands in front of Thompson Hall, named for Ann Thompson, a professor in curriculum and instruction who inspired Lee's wife and business partner MiOk Cho (PhD '91 curriculum and instructional technology) to create dynamic educational environments. Photo contributed by Anne Foegen.*

toward society in general," said Cho (PhD '91 instructional technology). "Instead of being taught certain issues, students tended to change their thoughts and attitudes when they explored the issues by themselves."

"In particular, the international learning environment at ISU was very interesting in those days," Lee said. "I could see students present their own ideas and thoughts to the class, participate in discussion that challenged other students, and cooperate for class projects. We thought that if we could create such a dynamic environment in Korea, then we could help people develop their own future for our society."

The leadership training center sits on 5.5 acres of land and contains 30 buildings, resembling a small village, Lee said. The training center is being transformed to train Korean students through an alternative, United States-inspired curriculum, as well as host leadership development programs for corporate customers.

The duo says they benefited from a synthesis of each other's

backgrounds in education and instructional technology that they received at Iowa State.

"Working together means we have lots of discussion, and we present different thoughts and ideas to each other," Lee said. "Our classroom experiences at Iowa State help us appreciate others' different thoughts on certain topics at issue, and help us work together."

The school will be a boarding school for middle/high school-aged children, and implement specific curriculum and activities so students have international perspectives and experiences while studying. Extracurricular activities will be available to help foster a sense of global citizenship and leadership, Lee said.

"The school is here to help students develop their potential and improve their lives," Lee said. "All the extracurricular activities are to help kids build a new awareness for their abilities and future possibilities. We believe our efforts will help kids improve their lives day by day, week by week."

## Connect. Learn. Share.

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*Food science and human nutrition assistant professor Buddhi Lamsal (right) and graduate student Tim Anderson analyze a liquid substance before preparing it for food processing. Lamsal said STEM skills are critical for students seeking a career in food science or food engineering. Photo by Jaclyn Hansel.*

## Food processing class serves as melting pot for STEM skills

By Laura Dillavou

A hearty serving of science, a dash of technology, a sprinkle of engineering, all mixed with mathematics, makes a perfect recipe for Iowa State University food science and human nutrition (FSHN) graduates ready to enter the industry, armed with an impressive array of STEM skills.

One of the core classes for building and refining science, technology, engineering, and mathematics (STEM) skills unique to the food science field is FSHN 471 – food processing. Led by Buddhi Lamsal, assistant professor in food science and human nutrition, his expertise in the area of food processing and engineering provides a solid base for the concepts and applications he teaches to young food scientists.

“In this class, all the STEM concepts are at work,” Lamsal said. “It’s my goal to teach them the principles behind food processing – based on thermal processing such as canning, pasteurization, dehydration, and extrusion – and non-thermal processing, such as irradiation. Then using their science, technological, engineering, and mathematical skills, they will learn how such processes affect food quality and safety.”

Along with making a food product safe to eat, processing, a key part of food preparation and delivery, affects the nutrition content, quality, and functionality of a product. Lamsal said any student wanting to work within the food science industry needs to bring finely-tuned STEM skills to the table.

“This is an applied industry,” Lamsal said. “We want our students to be the ones leading the research labs, testing different processes on various food items, evaluating the resulting products, and making the discoveries that impact the quality of our food supply. We are preparing them for the real world and giving them skills that are vital to this workforce and their success as young food scientists.”

Lamsal, who is wrapping up his first year teaching FSHN 471, said he continues to see improvements in students’ skills and their ability to put classroom concepts to work, both in the lab and on the job.



## 'Science of soft goods' relies on technical skills

By Laura Dillavou

From the buttons on your shirt to the soles of your shoes, the clothing we wear every day is STEM education in action.

While the connection between fashion and science, technology, engineering, and mathematics (STEM) education may seem a stretch, future fashion designers, production managers, and merchandisers leaving Iowa State have a deep knowledge and understanding of the STEM skills necessary to succeed in their industry.

Ruth Glock, a professor in apparel, educational studies, and hospitality management (AESHM), is considered a national expert in the area of apparel production. One of her classes, Technical Design Processes (TC 415), calls for a variety of STEM skills to be used when completing assignments.

"We're working with soft goods instead of hard goods, and sometimes, people fail to see how STEM skills are necessary in our field," Glock said. "As opposed to steel and atoms, we work with innumerable variables – the finish and dye of a fabric requires a knowledge of chemistry, taking a two-dimensional design to a three-dimension garment requires a lot of math skills, knowing what kinds of machines are needed for production relies on technical know-how, and students need to have a strong understanding of the software and technology used to make this all happen."

In TC 415, students create patterns, garment specifications, and mass production details with a variety of complex software. With the objective of creating a finished, true-to-size piece, students must also keep in mind scale conversions; unique garment characteristics, such as



Apparel merchandising, design, and production seniors Jarod Meyer and Sara Peiper analyze garment specifications using high-tech design software. Photo by Laura Dillavou.

the weight, finish, and dye of the fabric; and how the garment must fit the majority of body shapes once it is finished. Glock said students in her class get a big taste of just how technical the clothing industry is.

"Some students take the class and are shocked to learn how much math, science, and technology they must know in order to succeed," Glock said. "We are preparing technical designers just like other departments prepare scientists – we teach them to think using the scientific method and they are prepared to make decisions that best fulfill the questions and challenges they will find in the workplace."

As each season brings new trends in fabric, finishes, styles, and consumer demands, Glock said students need to enter the workforce with an arsenal of STEM skills, knowledge of global culture, and the ability to scientifically analyze new developments.

"People may not think of us as 'engineers,' but from your jeans to your wallet, there are numerous STEM skills that went into developing, creating, testing, and producing that product. Textiles and clothing is truly the science of soft goods."

For more information on 'science for soft goods,' visit [www.hs.iastate.edu/hsmatters](http://www.hs.iastate.edu/hsmatters).

### Mark your calendar for "Behind the Scenes Day"

Future fashionistas can get a jump start on the road to the runway at the 2010 Behind the Scenes Day, April 2, 2010, sponsored by the College of Human Sciences and the Department of Apparel, Educational Studies, and Hospitality Management.

Behind the Scenes Day provides prospective students with the opportunity to learn about textile and apparel design, merchandising production and historic collections during mini-presentations throughout the day. Additionally, students will be able to meet with admission counselors, faculty, and attend a dress rehearsal of the Textiles and Clothing Fashion Show and Design Competition.

For more information on the 2010 Behind the Scenes Day, including a complete schedule and the mini-presentations that will be offered, visit [www.hs.iastate.edu/future/deptdays/tc.php](http://www.hs.iastate.edu/future/deptdays/tc.php).

## Chew on this: Derrick, students measure force of jaw joints

By Michelle Rydell

Instilling a passion for research at a young age isn't always an easy feat for professors. But for Tim Derrick, an associate professor in kinesiology at Iowa State University, training young minds to think beyond the textbook and use critical STEM skills comes effortlessly.

Derrick's teaching techniques are easy to identify - lead by example. His passion for science, technology, engineering, and mathematics (STEM) education draws some of the department's brightest students to his laboratory, eager to receive hands-on experience.

Two of his undergraduate research assistants, junior kinesiology students Jim Stenson and Scott Funke, are working with Derrick on research that could benefit sufferers of Temporomandibular Joint Syndrome (TMJ). TMJ causes pain near the jaw joint and affects more than 10 million people in the United States, according to statistics from the National Institutes of Health.

Funke, who received early acceptance to dental school, said he was interested in pursuing research opportunities that could give him experience related to dentistry and biomechanics. Stenson plans on attending medical school.

The purpose of their study is to analyze forces generated by the jaw joint by recording small amounts of electrical activity within the muscles through electromyography, Derrick said. Although previous research has been conducted to measure forces in muscles, no study has analyzed forces generated while chewing.

"We'll have subjects chewing different sizes and types of food, and measure what the forces are in the jaw during those different activities," Derrick said. "Eventually, we can give recommendations of what kind of food you should chew and what you should avoid if you have TMJ."

The study will begin testing subjects in December and present their findings at an honors program conference in the spring. But both Stenson and Funke agree that the benefits of a STEM education reach far beyond their research with Derrick.

"A lot of students at other colleges don't get experience with research at a young age," Stenson said. "We've been pushed to move beyond books and extend our knowledge base outside of the classroom."

"You don't stop your education as soon as you get your diploma," Funke said. "We're gaining lifelong skills that will make a big impact on our future."



*Junior kinesiology majors Jim Stenson and Scott Funke use retro-reflective markers that record electrical activity to measure the forces in the jaw while chewing. Photo by Jaclyn Hansel.*