

THE Engaged

Scholar MAGAZINE

“By the time kids finish 9th grade, they should be able to understand the effects of genetics, the effects of the environment, and the combined effects of genetics and the environment on their lives.”

Michelle Williams

Associate Professor
Department of Teacher Education
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science and technology

Dr. Michelle Williams is the principal investigator on a \$2.3 million National Science Foundation grant to develop technology-based genetics curricula.

SEE PAGE 2

THE **Engaged****Scholar** MAGAZINE**FOREWORD**

This issue of *The Engaged Scholar Magazine* is about science and technology. As we put the issue together, I began to think of it as the “science and...” issue: science and ethics, science teaching and learning, science and economic development, science and communication technology—to name just a few of the subject areas that MSU scholars are exploring every day.

The mid-Michigan area celebrated science in a big way this year, with the introduction of the MSU Science Festival, held in April 2013. The Festival was a ten-day celebration of science and learning that was enriched by presentations and support from more than 80 MSU centers, clubs, colleges, departments, institutes, and other academic offices, as well as a small but powerful slate of guest presenters. We tried to capture some of the fun and excitement with a photo collage of Science Festival activities in this issue. Be sure to watch sciencefestival.msu.edu as the lineup for the 2014 festival develops.

Finally, we introduce a new column with this issue of the magazine. A companion to the “Think Piece” from senior engaged scholars that is already a regular feature of each issue, “Community Voices” will focus on engaged partners who have collaborated across a range of projects with MSU. For this inaugural “Community Voices” article we talked to Joan Nelson, executive director of the Allen Neighborhood Center on Lansing’s Eastside.

Linda Chapel Jackson
Editor

The Engaged Scholar Magazine is published annually by University Outreach and Engagement, Michigan State University. The magazine focuses on collaborative partnerships between MSU and its external constituents—partnerships forged for mutual benefit and learning, with an emphasis on research.

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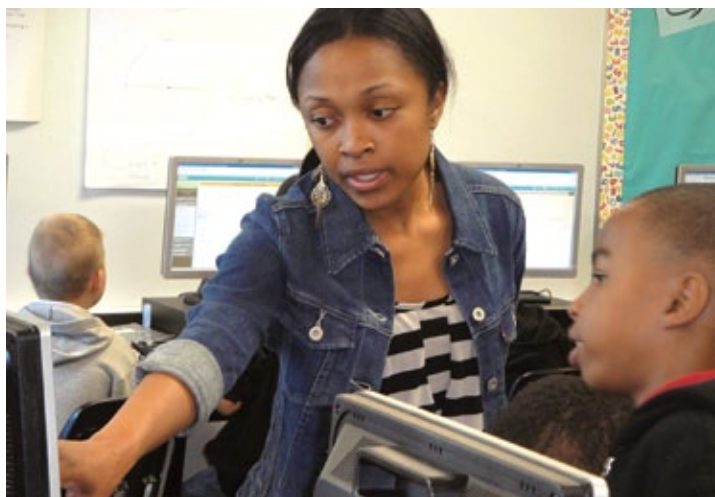
technology

GETTING **kids** exci

teachers
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“**H**ow to engage kids—not only teach them content—but engage them, get them excited about science” is the passion of Michelle Williams. Dr. Williams is the principal investigator on a \$2.3 million National Science Foundation grant to develop technology-based genetics curricula and assessments for 5th, 7th, and 9th grade students. “Genetics is very relevant to everyday life,” said Williams. “Even if students don’t go into science as a career, it can help them make better decisions about their own lives.”

But studies show that students, even at the early college level, have some misconceptions about genetics.



Photos and illustrations courtesy of Michelle Williams

Wintril Maiden’s 5th grade science class uses visualizations to learn about genetic inheritance in Fast Plants.

So Williams and her team of mentor-teachers, principals, educational researchers, assessment experts, technology experts, scientists, and students are working with two school districts—East Lansing, Michigan, and Cedar Hill, Texas—to develop a curriculum package that improves kids’ real-life understanding of genetics. This package includes an assessment component that allows teachers to see in “real-time” and long-term how their students are grasping and retaining the material, a technology component that allows students to visualize and interact with the material, and a professional development component that involves a mentor-teaching model, ensuring future sustainability of the curriculum.

Williams oversees the curriculum development, incorporating ideas from her team of students, researchers, and teachers. The curriculum introduces progressively more complicated genetics concepts into each level.

At the 5th grade level, students learn fundamental concepts about heredity. Robert Voigt is a 5th grade teacher in the East Lansing School District. “Through reading, discussing, and actually growing little ‘Fast Plants,’ students come to experience that variations in plants and animals are common and are actually the rule, not the exception,” Voigt explained. “Students learn that variations are caused by both genetics and the environment, and that such variations can actually have important consequences for the adaptation and survival of the species.”

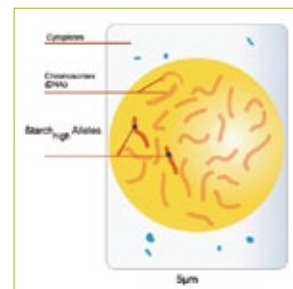
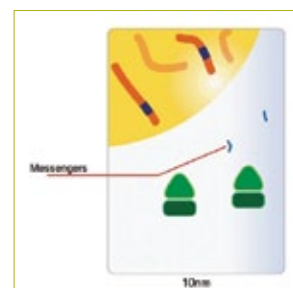
As students are introduced to the 7th grade curriculum the questions and activities become more challenging. Using a familiar organism, such as rice, students investigate genetics principles to solve problems, such as creating a more nutritious food supply. “In 7th grade it’s more complicated,” said Angela DeBarger, Ph.D., William’s co-PI from SRI International (an independent nonprofit research institute in Menlo Park, California). “It gets more to the process of what’s going on inside a cell.”

Williams’ goal is to help kids be prepared by high school to have a more sophisticated genetics repertoire to build on. “But we need to know better what they know and what they don’t know,” she added, “so we can develop materials that promote an integrated understanding of genetics.”

Assessing Student Understanding

While Williams oversees the curriculum development, DeBarger leads the design of assessments in each of the units.

According to DeBarger, the two broad goals in designing the assessments are to help teachers assess whether students are understanding the concepts or are developing problematic or non-normative ideas (such as the belief that girls will always look like their mother and boys will always look like their father) and to help them be more reflective about their learning. Using embedded assessments to measure the impact of visualizations on student comprehension, teachers can determine students’ immediate understanding and longer term knowledge retention.



The 7th grade curriculum uses familiar organisms such as rice to investigate genetic principles and solve problems.

ted about science

Article by Amy Byle

Using Visual and Interactive Technology

Using the Web-based Inquiry Science Environment (WISE) open-source platform developed in Berkeley, California, the team is able to create units with activities that build on each other, using a “predict-observe-explain” model. According to Williams, this helps kids sort out ideas and develop their reasoning processes. “Our goal is to build understanding and link ideas—to merge science and everyday life.”

Each activity begins with a driving question, such as “Why do plants of the same species vary in how they look?” Then, using a number of innovative online tools, the kids—and teachers—are able to follow their progress. For example, the Idea Basket Tool gives kids the opportunity to formulate and defend their ideas. “The aim is for them to construct scientific explanations and use evidence to support their explanations,” said DeBarger.

“The students loved it because it was so novel—offering online experiences including an online textbook, simulations, short video lessons and blogging opportunities,” said Voigt. “It was a nice mix of classroom interaction, hands-on experience, and computer-based learning. I liked it because it was well thought out and allowed me to interact with the developers. I felt some ownership in the process.”

Ensuring Sustainability Through Professional Development

The program is facilitated by mentor-teachers who support classroom teachers through model teaching and observations, professional development opportunities and team meetings. For example, Wintril Maiden, a mentor teacher in the Cedar Hill Independent School District in Texas, oversees the implementation of the Genetics Unit for 5th grade science. Maiden noted that “this program supports our curriculum by giving the students an inquiry-based, real-world activity in which to participate,” she said. “The various activities that encompass the 5th grade unit allow the students to put the pieces of our driving question together and eventually understand and be able to express understanding through their responses and peer-interactions.”

The project is in a continual process of refinement. “It’s a good challenge,” explained DeBarger. “This project is on the forefront of creating an approach for designing curriculum and assessments that are in line with Next Generation Science Standards (NGSS).”



Tasha Dixon engages her 7th grade students in learning about gene expression in plants and animals.

As the project heads into its third year, Williams’ team will be developing and preparing to implement a 9th grade curriculum that will encourage kids to think about a career in science. “By the time kids finish 9th grade,” said Williams, “they should be able to understand the effects of genetics, the effects of the environment, and the combined effects of genetics and the environment on their lives.”

For Williams, this project brings together her love of plant biology with her passion for teaching. She noted, “I enjoy working with real teachers and real kids in real schools and the collaborative nature of the work,” adding, “I decided to focus on this because it’s personally relevant—and it’s a lovely way to teach science!” 🍌



› Michelle Williams

Associate Professor
Department of
Teacher Education
College of Education

“We couldn’t do this without a collaborative. SRI International created great visuals on how traits are inherited and expressed. Our open-source programming platform resides at Berkeley. We have high school teachers on our design team. I have students with a background in measurement. We Skype all the time.”



Today's children are increasingly tech savvy and expect to use digital technology virtually everywhere, including in their schools. Their teachers want them to have technology-enriched, pedagogically sound learning experiences at school but may not always know which technology enhanced approach (such as blended learning) or tool (such as a particular software program) is the best fit for their curricular and student assessment goals.

Teresa (Terri) Gustafson has, for the past five years, been helping address the needs of Michigan K-12 teachers, school administrators, and the technology integration specialists who work with teachers, through her involvement with the Michigan Association for Computer Users in Learning (MACUL). MACUL is a nonprofit, statewide organization dedicated to the effective use of educational technology from preschool through college level and is an affiliate of ISTE, the International Society for Technology in Education.

Engaging with Partners for Mutual Benefit

Ms. Gustafson was initially inspired to get involved in MACUL through her work as assistant director of the Center for Teaching and Technology in the College of Education. However, she has also found her participation in MACUL to be extremely useful to her studies as a Ph.D. student focusing on higher education administration. In her role as assistant director, she provides technology support and development programs for faculty and graduate students. She also helps the college's student teachers who are doing their internship year in Chicago Public Schools communicate with faculty and peers and access course information and resources remotely. While the nine undergraduate students she works with provide assistance with computers and audio/video equipment, Gustafson offers consultations and workshops to help faculty and graduate students make the best use of educational technology tools and software.

Accepting an Opportunity to Represent MSU

Gustafson's initial work with MACUL was as a member of one of its special interest groups that organized MACUL's annual conference on technology for Michigan educators. In 2008, Gustafson joined MACUL's Professional Learning interest group, where she provides advice on matters such as what workshops to consider for the annual conference. In 2012, she was asked to join MACUL's sixteen member Board of Directors as the higher education representative for Michigan. "I jumped on the opportunity to run for the board," said Gustafson, "so I could represent MSU in an organization that has as far a reach as MACUL. They are everywhere when it comes to instructional technology for schools."

Extending the Reach of an Educational Technology Conference

Working with Dr. Leigh Graves Wolf, assistant professor and co-director of the Master in Educational Technology (MAET) program, Gustafson co-plans (and her office co-sponsors) the College of Education Technology Conference that takes place annually each fall. She also presents a workshop there. In addition, she requires that the nine undergraduate students she works with co-present a workshop with her, another presenter, or a graduate student.

Since being involved with MACUL, she has worked to extend the reach of this conference well beyond the East Lansing area. Gustafson noted: "When I first took over the position, the conference was more aimed at the local population and at pre-service teachers and interns. My goal was to attract more teachers, superintendents and administrators to come from Detroit, Grand Rapids, Mount Pleasant—from wherever they could come."

Gustafson also has presented half-day workshops at MACUL's annual conference, on topics like how to incorporate software into classroom activities.

Exploring How Students and Teachers Use and Understand Technology

While Gustafson's background is in broadcasting, she obtained a master's degree in educational technology in the same college where she now works. As she became more involved in administration, she decided to pursue her Ph.D. in higher education administration and is scheduled to defend her dissertation proposal in autumn 2013. In the research for her dissertation Gustafson will be exploring how the current generation of students in higher education views the technology they use as learners and as "digital natives." Focusing on students who have already completed four years of college, Gustafson wants to understand how future educators currently interact with technology, how they will use it to teach, and how they themselves use technology to learn.



Photos by Paul Phillips

Gustafson's involvement with MACUL has affected both how she does her job at the College of Education and the direction of her Ph.D. coursework and research. Regarding the impact on her job, she says, "It really has made me think about the technology and the projects I initiate here in the college, because our students are going to be teachers in those districts some day and I want to prepare them the best way I can so they have some idea when they step into the classroom, of what the technology is and how they might use it—in a way that's pedagogically sound and of benefit to their students." Her work with Michigan's K-12 teachers has allowed her "to better understand and learn about how teachers use and understand technologies for their classrooms, how administrators view the challenges that they have, and also how teachers deal with the challenges of incorporating technology into the classroom."

Advocating for Sound Educational Technology Policy

Additionally, Gustafson chairs MACUL's Advocacy Subcommittee, which stems from her interest in technology policy for K-12 and higher education. One of her goals is to make sure that Michigan lawmakers are aware of the importance of educational technology in K-12 schools; the subcommittee has a booth at the annual conference to encourage participants to contact their legislators about this topic.

Terri Gustafson wants to understand how future educators currently interact with technology, how they will use it to teach, and how they themselves use technology to learn.



Jennifer Flaggman and Terri Gustafson look at a new feature in iOS7.

MACUL executive director Ric Wiltse is appreciative of Gustafson's contributions, noting, "As our higher education representative, Terri plays a key role on the MACUL Board of Directors. She heads our efforts to advocate for educational technology at the local, state, and national level. Her grasp of the issues facing not only higher education but also the K-12 level enables our Board to keep current with legislation that will affect how teachers teach and how students learn with technology. Terri is a tremendous asset to our Board."

Gustafson is similarly enthusiastic about her experience with MACUL and admires the dedication of the Board members, many of whom are or were teachers or school administrators. "Everybody on the Board loves what they do," she says. "They're dedicated to the kids, and they wouldn't be doing it if they didn't love it." 🍌



➤ Teresa M. Gustafson
Assistant Director
Center for Teaching
and Technology
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TEACHING AND LEARNING: massive o

Technology affects life today in many, often unpredictable, ways. One revolutionary change in education involves a new type of learning offered on the Internet. Known since 2008 as MOOCs, Massive Open Online Courses are free classes with subject matter taught by faculty from institutions ranging from Ivy League to community college. Because classes are offered on the web, they can attract a vast range of participants from around the world and from diverse education levels, ages, and ethnicities.

Stephen Thomas sees MOOCs as a rare opportunity to make education more accessible to more people, in much the same way a museum exhibit offers information compiled in a structured format that is available for anyone to learn about and understand.

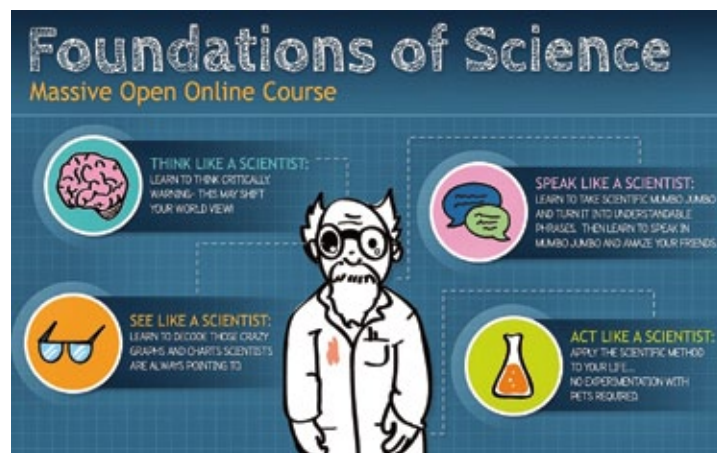
Dr. Thomas believes that online learning can reach those who have had few educational choices, and make a significant difference in educating nontraditional classroom learners such as those with autism. His effort to utilize educational tools to their greatest effect for more members of society involves exploring curriculum development, creativity, and connections with communities that embrace and promote an egalitarian approach to education.

Teaching science to non-scientists is another goal for Thomas. He discovered that “soft” introductions to weekly topics, such as hand drawn comics that depict topical concepts, worked well, particularly for those students who expressed anxiety about the complex nature of the subject material. He also found that posting a series of images with explanations on a YouTube channel under Evolartist was both well received and effective. One of his courses won an AT&T/MSU award for best online class, as well as the James D. Hoeschele Endowed Teaching Award for excellence in teaching science to non-science majors.

Creating an Online Science Curriculum

Thomas’s research focuses on the role instructional technologies play in engaging students, and he designs course curriculum to challenge critical thinking skills and promote active participation. One of his most recent accomplishments involved designing, implementing, and evaluating an online course funded with a grant from the Bill and Melinda Gates Foundation.

The primary focus for Thomas and colleague Julie Libarkin, geological sciences associate professor and co-PI on the grant, was to create a science curriculum for a far-reaching audience that included learners with varying skill levels in technology and education. The Gates Foundation supported the project, in part because of the potential for MOOCs to dramatically change international education, broadening the ability of teachers to reach remote or inaccessible populations. The current challenge



Foundations of Science curricular materials

is to conduct enough MOOCs to analyze successes and challenges, and ultimately create a template for successful MOOCs that can serve as a starting point for Internet- and other forms of technology-based education.

The course, Foundations of Science, proved to be “a crazy experience in all ways,” according to Thomas. “One of the biggest misconceptions is that you don’t have to do much if you participate in online learning. It is not passive. It is interactive and dynamic, and requires significant effort on the part of students, instructors, and a team behind the scenes,” he said.

Ryan Yang, assistant director of the Learning Design and Technology Center at MSU, mirrors this attitude about the need for teamwork: “Working on the Foundations of Science MOOC gave our team an opportunity to design an effective course for a large audience. The peer-learning exercises and assessments for digital badging that we developed with Dr. Thomas may benefit future MOOCs and large online courses at MSU.”

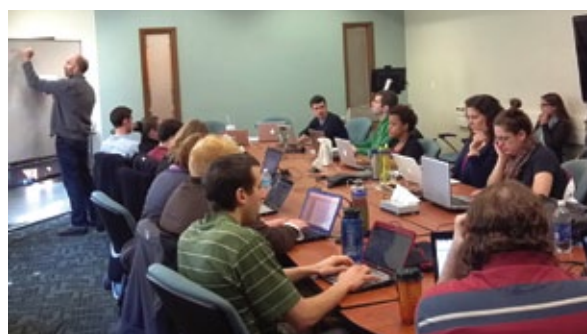
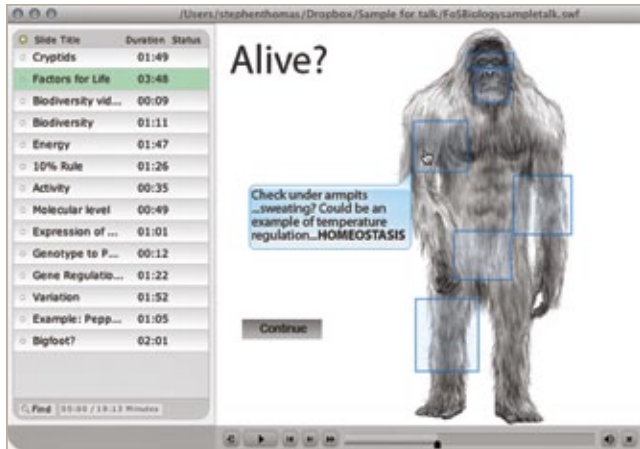


Photo courtesy of Stephen Thomas

Foundations of Science development team at work

Open Online Courses

Article by Carla Hills



Graphics courtesy of Stephen Thomas

said Thomas, adding that “MOOCs present a unique situation because you are working with everyone from retirees to home schoolers, and they can be anywhere around the globe.”

The registration for Foundations of Science included 1,250 participants from 37 countries and 37 US states. The attrition rate was 90 percent, in line with the emerging statistics for those who complete free online courses.

Securing Institutional Support

Offering MOOCs requires substantial institutional support. Thomas stressed the importance of buy-in from the dean, department chair, IT staff, communications and marketing staff, administrative support staff, and faculty colleagues. “Preparing for a MOOC takes coordination up and down the ladder, and everyone has to do their part for things to run smoothly,” he said. “There is definitely more involved, and everyone needs to work together.”

Strengthening MOOCs Through Community Connections

One of the key insights for Thomas came when the Foundations of Science MOOC was nearing completion. “It is clear that building relationships with community partners will lead to greater success for educators who design MOOCs and the participants who sign up for these courses,” said Thomas. He pointed to forming connections with nursing homes, libraries, home school associations, prison education programs, faith-based groups, nonprofits, and a host of other organizations that could work with MOOC administrators to better address community needs and spread the word about course offerings that benefit both those seeking education and those looking to employ a more educated workforce.

“These are virtual classrooms, and students benefit from creating a sense of community and engaging each other. The technology opens a new frontier, and I’m working to create some of the best methods for those who may not have yet had a chance to access education in a way that is now possible,” said Thomas. 🌟

Building a Collaborative Team

Thomas and Libarkin had a short production timeline and moved quickly to hire graduate students to help develop the course. After combing through the applications of many qualified candidates, they hired 23 students to assist with curriculum development, instruction oversight, and evaluating participant performance. They paired student groups with faculty teams to improve critical thinking in the MOOC curriculum and to develop a supplemental “how to teach an online course” session for the graduate students.

In addition to the graduate students and the Gates Foundation, partners included Matt Rowe and Marcus Gillespie of Sam Houston State University as well as internal partners: MSU Global; Desire2Learn; LearnDAT (MSU’s online instructional design team); College of Arts and Letters; Adan Quan, Anthropology; Carmen McCallum, Center for Integrative Studies in General Science; and librarians from MSU Libraries.

Creating Original Content

Thomas put substantial effort into creating original images and building original content because of copyright issues involved with online learning. He hired an artist to generate some of the images and now regards the creative process as an essential part of planning and budgeting for future MOOCs.

“We tried to have fun with the material but also be robust in the amount of information conveyed. The key messages still have to come across, and the only way to do that is to cover a tremendous amount of material. The expertise is in presenting a great deal of information and having students pick it up without thinking that it is painfully boring or complicated,”



➤ **Stephen R. Thomas**
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Department of Zoology
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cultural economic educational IMPACTS

Astronomy has been called the “oldest science” because people have been looking up in the sky and contemplating what it means since civilizations developed intellectual capacities.

According to Megan Donahue, astronomy bridges cultural barriers because everyone has access to the stars. Dr. Donahue is on the steering committee of the International Astronomical Union (IAU) Office of Astronomy for Development and, along with other fellow astronomers and astrophysicists, is working to introduce science into communities, make the connection between education and good jobs, and boost economic development and the infrastructure in some of the poorest communities around the world.

It’s hard to know when Donahue rests. She conducts astronomy and astrophysics research, teaches astronomy, authors textbooks, delivers public talks about astronomy, and shares her scientific expertise with local, national, and international communities. She is on the astrophysics oversight committee for NASA, the National Science Foundation and the Department of Energy, where she guides the efforts the nation spends on space research into the most fruitful and scientifically interesting areas.

Studying the Evolution of Galaxies

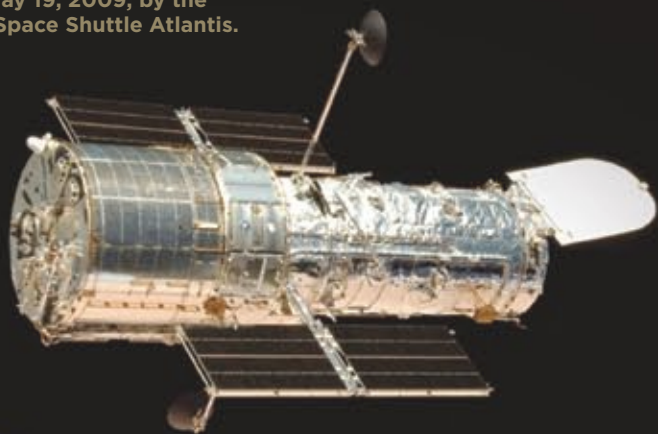
Two years ago Donahue became a member of an international team of scientists studying some of the most massive clusters of galaxies in the universe. The Cluster Lensing and Supernova with Hubble (CLASH) program was awarded 524 out of approximately 2,200 orbits during

three observation times between 2010 and 2013. Those 750 valuable hours of time with the Hubble Space Telescope have been utilized to map the dark matter in galaxy clusters using gravitational lensing, detect very distant supernovae (exploding stars), detect some of the unknown distant galaxies, and study the structure and evolution of galaxies.

The CLASH team has documented the discovery of MACS 1149-JD, a galaxy that formed 490 million years after the Big Bang, at the time when the universe was less than four percent of its current age.

The work continues around the clock, making dialogue with colleagues from different parts of the world a time challenge. The CLASH scientists try to schedule weekly telephone conferences, and with participants spanning the U.S., Europe, Taiwan, and Israel it means that at least one scientist always calls in outside of their normal working hours. Donahue checks her email regularly to answer questions, review proposals and edit drafts. She also spends a fair amount of her time downloading data from the team websites, writing data analysis programs, and analyzing data.

Hubble drifts over Earth after its release on May 19, 2009, by the crew of the Space Shuttle Atlantis.



“I see astronomy as a catalyst for producing an educated and scientifically aware society.”

Megan Donahue

“One of our goals is to enhance local economies via astronomy outreach. That can be done by stimulating the development of communications and technology, and motivating education in science and technology.”

Megan Donahue

OF ASTRONOMY

Article by Carla Hills

International Year of Astronomy

As a member of the American Astronomical Society Council, Donahue voted her support for the International Year of Astronomy (IYA) 2009, a global effort organized and coordinated by the IAU and the United Nations Educational, Scientific and Cultural Organization (UNESCO) and supported by nearly all of the countries in the world. The vision was to help citizens worldwide rediscover how science impacts their lives, particularly through astronomy examples in the daytime and nighttime sky, recognizing that sharing these fundamental scientific wonders could lead to a more equitable and peaceful society.

The yearlong effort inspired ideas about how to motivate children and adults to learn more about scientific concepts and the world around them.

“Someone developed an inexpensive telescope that could be put together by non-experts for under \$10. It’s as good as Galileo’s scope was 400 years ago; it shows Saturn’s rings, moon craters, and other sorts of things. Donors would buy the scopes and give them to schools. It was a huge success. There were community astronomy festivals that included artists, kite flying and other activities. People really became enthusiastic about the science of astronomy,” said Donahue.

She has been on the steering committee for the IAU’s Office of Astronomy for Development since 2011. The goal is to continue the momentum of the International Year of Astronomy 2009, and provide a clearinghouse for international outreach efforts around the world.

“One of our goals is to enhance local economies via astronomy outreach. That can be done by stimulating the development of communications and technology, and motivating education in science and technology,” said Donahue.

Economic and Educational Impacts on Regional Communities

According to Donahue, astronomy can link people in developing countries with an opportunity to learn, study, and use science in their lives and in their local economies.

Donahue points to the South African Astronomical Observatory, established in 1972. The Southern African Large Telescope near Capetown, South Africa, is one of the largest observatories in the world. “The South African government recognizes that the observatory is an important part of their community. It’s a civilian effort that provides jobs, inspires local students to learn about science, brings about technology infrastructure development such as the Internet, and has a stable influence over the economy,” said Donahue.

“The National Astronomical Observatory of Chile—and its astronomical discoveries and contributions to the global science community—is a visible example of national pride. The telescope plays a prominent role in Chile’s national identity, and more broadly identifies its success with economic success for all,” said Donahue.

Introducing astronomy intrigues children and adults, and learning about the fundamental concepts can encourage exploration and education in math, engineering, science, technology and teaching careers. “I see astronomy as a catalyst for producing an educated and scientifically aware society,” said Donahue.

Some of her best professional moments have come during solitary times. “When I discovered a supernova for the first time I remember sitting there and realizing that I’m the only person in the world that knows this exists. It is profound, awe-inspiring. Then the work begins anew with next steps to convey discoveries and educate the public. And I’m really honored to be a part of it.” 🌟



➤ **Megan E. Donahue**
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College of
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INFORMING CONSENT

The Michigan BioTrust for Health

Article by Linda Chapel Jackson



Ann Mongoven has been involved with the Michigan BioTrust for Health, an initiative that oversees the preservation of newborn blood samples and the development of policies for their use, since before its public rollout in 2009.

Newborn Screening in Michigan

The issue itself dates back to 1965, when Michigan law began requiring all newborn babies to be screened for serious medical conditions, such as phenylketonuria and sickle cell diseases, that require early treatment. A few drops of blood are taken from the baby's heel and put onto a paper card, which is then sent to the state public health lab for testing. Over the years, more than 4,000 babies with one of 50-plus conditions have been found and treated.

Because of the public health value of detecting treatable disease early, newborn screening is mandatory in Michigan. In the past, leftover blood samples were stored for several years in case they were ever needed by the family (e.g., to identify a missing child) or public health officials (e.g., to improve the newborn screening process). Medical researchers were also occasionally allowed to use de-identified samples.

Policy Shift as Genetic Research Capacity Evolves

Following an explosion of genetic research in the 1980s it became clear that the leftover samples were an invaluable asset for future research. Using the bloodspots for research is different from using them for medical testing, the original purpose for drawing blood. In 1999, a governor's policy commission on the uses of new genetic medical knowledge recommended that the samples be stored indefinitely, and for the first time began to address issues of donor privacy and consent to use the samples for research in the context of medical ethics

as a whole.¹ The commission concluded it was acceptable to use the bloodspots for research without consent as long as identifying information was removed. The commission's report also recommended that the Governor provide a mechanism for ongoing expert advice and policy analysis as the field of genetics evolves.

The Michigan BioTrust for Health

In 2000 the Michigan legislature passed a law allowing the samples to be used for research. As the importance of genetic research continued to escalate, several years of policy debate followed. In 2009, state policy moved from *allowing* to *encouraging* such research, with the establishment of the Michigan BioTrust for Health. The BioTrust is an initiative that oversees both the preservation of the samples and the development of policies for their use, with a mission of supporting health research for the public good.

Public discourse changed between 1999 and 2009, when the BioTrust was founded. In the intervening time, a national survey determined that most parents felt it was ethically obligatory for the state to ask permission to keep their children's blood for research. In Minnesota and Texas, legal



Visitors check out exhibits at a Michigan BioTrust public education event.

¹ Michigan Commission on Genetic Privacy and Progress. (1999, February). Final report and recommendations. Lansing: Michigan Department of Community Health. Retrieved from michigan.gov/documents/GeneticsReport_11649_7.pdf

Photos courtesy of Ann Mongoven

MICHIGAN BIOTRUST PARTNERS

- **Michigan Department of Community Health**—Oversees the Newborn Screening Program and the Michigan BioTrust for Health
- **Wayne State University**—Maintains the storage facility at its Biobanking Center in TechTown
- **Michigan Neonatal Biobank**—Responsible for storage and management of the samples at the WSU facility
- **Van Andel Institute of Grand Rapids**—Provides the custom-designed database system for archiving about 4 million bloodspots

injunctions restricted such research after citizens' lawsuits successfully claimed that research on the bloodspots without consent was a privacy violation. Concerns for privacy centered on the unique nature of human DNA, which is found in the bloodspots, and on questions about what data could be linked to the bloodspots. In 2010, Michigan became the first state to develop an explicit consent process to ask parents for permission at birth. However, the state maintains an "opt-out" process for Michiganians born between 1984 and 2010. Few of the millions in that cohort realize the state has their de-identified blood and that it can be used for research.

Exploring Public Opinion and Improving Citizen Oversight

The University of Michigan and MSU have received federal grants to explore public opinion about the BioTrust, recommend administrative structures to guarantee citizen input and oversight, and develop tools for public education. In a previous

“Conducting community engagement in Michigan on the BioTrust presents a sort of Goldilocks problem—the challenge is to reach a large number of people without sacrificing the depth that is needed to communicate on such a complex issue. Dr. Mongoven has shown herself to be a leader demonstrating creativity and innovation in her partnership with MSU Extension. She contributes seemingly limitless intellectual energy to improve the quality of our work and to consider every facet of biobanking ethics.”

Sharon Kardia

Director
Life Sciences and Society Program
University of Michigan

grant, U-M developed a public outreach and research website, and also conducted town hall meetings with diverse community groups. In the current grant, from the NIH Eunice Shriver National Institute of Child Health and Development, U-M and MSU are working together. Sharon Kardia, director of U-M's Life Sciences and Society Program, is the principal investigator of the five-year (2011-2015), \$3 million NIH grant. Mongoven, along with co-investigator Stephen Lovejoy, associate director of MSU Extension, directs the \$1 million MSU subcontract of the grant.

U-M has focused on efficient engagements with high numbers of people, such as a Facebook campaign and a statewide tour of college campuses. MSU has focused on a “thick” form of engagement—citizen deliberative processes, with a smaller number of people but high time-and-briefing intensity. In the next stage of the grant U-M and MSU will collaborate to integrate some of the most successful features of each kind of engagement in mass education that includes an interactive, deliberative element.

The MSU Deliberative Processes

In 2008, as the BioTrust was undergoing development, Center for Ethics and Humanities in the Life Sciences colleagues Professor Leonard Fleck, Mongoven, and graduate student Sarah Marzec convened a citizen jury from mid-Michigan for a pilot exploration of ethical and policy issues surrounding it. The study was funded by MSU's Institute for Public Policy and Social Research. Most of the 20 jurors supported using the bank for research, but they had concerns about consent, privacy issues surrounding the de-identification process for samples, commercial development, and other issues. They recommended that a “community values board,” with members nominated by community organizations, be appointed to ensure community input into policies governing goals and ethics of the BioTrust.



Michigan Department of Public Health (MDCH) heeded recommendations from the jurors and other sources, and established a Community Values Advisory Board (CVAB) for the BioTrust.

Then, during the fall of 2011, the MSU team used their NIH funding to scale up the deliberative process to a statewide level. Their goal was to ascertain the range of acceptable bioethical policies and areas of consensus/non-consensus, and come up with a set of recommendations for the CVAB and MDCH.

The team recruited 70 deliberators from seven regional groups. “MSU Extension was a key asset to the success of the project,” Mongoven said. “Several of their educators have specialized training and experience in public policy deliberative processes and meeting facilitation. And they are embedded in every county in Michigan. They helped to recruit citizens in each region as well as to facilitate the 20-hour process. Claire Layman, MSU Extension state public policy education specialist, is drawing on the structural model of the deliberations to inform wider-ranging civic facilitation initiatives within Extension.”

“We tried to inject diversity every way we could think of,” said Mongoven. “We intentionally oversampled racial, ethnic, and social minorities. We recruited from different education levels, age groups, socioeconomic groups, occupations, political ideologies, and religious affiliations. And we included written, aural, and visual education tools for diverse learning styles.”

The jury took up questions of research, consent, privacy, and oversight. Officials from MDCH briefed the participants, as did other experts on science, law, and ethics of biobanking.

continued on page 12

INFORMING CONSENT

The Michigan BioTrust for Health**Findings and Recommendations of the Citizen Jurors**

Most participants supported the use of the bloodspots for research, but their support was contingent on an expected good-faith effort by the state to address some outstanding concerns. Their overriding recommendation was to increase public education so people know their options. As they repeated throughout the process, “You can’t opt out unless you know you are in.” Although participants agreed privacy was an important issue, they felt that state educational materials focused too exclusively on how the bloodspots were “de-identified” through a coding process. They also wanted to know more about data that would be linked to the bloodspots. Participants were interested both in good research outcomes and in protecting themselves from risk. They wanted to know more about what research the BioTrust supports now and what processes would insure it supports high benefit/low risk research in the future. And they wanted more “people like us” on the BioTrust’s Community Values Advisory Board—people who were not nominated by health organizations that might be seen to have a vested interest in the BioTrust.

The participants’ hopes, concerns, and recommendations were delivered to the CVAB in March 2012. Mongoven put together a summary of the jury’s recommendations, and deliberators from four regions of the state participated in delivering the testimony. At the same time they submitted a list of immediately actionable items, mostly having to do with making information about the BioTrust and the CVAB more accessible to the public. MDCH has implemented the most

important of these: creation of three new “community member” seats for the CVAB; the posting of lay—not only scientific—abstracts of supported research on the BioTrust website; and clarification of consent documents.

Developing Tools for Education

Mongoven is now developing educational materials for the general public to appear on the BioTrust’s website, the U-M website, and other relevant educational sites. “We’re piloting an educational tool,” she said. “The state will host a link to it. People could use it, for example, at PTA meetings.”

The education program is important, said Mongoven, because “the majority of people don’t know they (or their children) have blood in the bank. Consent and privacy are important, but they are not the only concerns. People want to know what research is being done, the moral issues about it, and how the research gets funded. The tool presents this broader picture.”

Lessons Learned

Mongoven is pleased with progress on the BioTrust project to date. The real credit, she feels, goes to the deliberators: “Their conversations resulted in persuasive testimony to the State. It changed some of the terms of discourse, and some oversight processes. The State also deserves much credit—it both participated in the process and listened to the results. The BioTrust’s advisory process and our own educational materials have both been improved based on those robust citizen conversations.” Personally, the project has also given Mongoven an opportunity to “rethink what ‘informed consent’ means in the context of biobanking” and to publish an article on the topic.

She is also pleased with the quality of student involvement in the program. “Seven graduate students and three undergrads have worked on the project. We simply could not have done it without them.” The graduate students worked as co-facilitators of the deliberations and as research assistants. A creative undergraduate designed visuals for the educational tool. Three students are part of the team for the next phase of the project.

Future Directions

“The potential reach of the bank keeps expanding,” said Mongoven. “It gets more important as time goes on. It’s important to address the issues proactively before they come at us.”

“Michigan has an opportunity to be a pioneer in this area,” she added. “Twenty states have banks but Michigan is progressive in two ways. One, we’re the first state to create an opt-in process (asking for permission to use new samples). Two, the trust’s oversight includes a functioning Community Values Advisory Board—and that’s a big accomplishment.” 🌟



Ann M. Mongoven
Assistant Professor
Center for Ethics
and Humanities in
the Life Sciences
(CEHLS)
College of
Human Medicine



Joint U-M/MSU grant team at summer meeting 2013

“The MSU team have made outstanding contributions to all dimensions of this project. We have developed a strong, collaborative working group and I have been very impressed with Ann’s determination, intellectual curiosity and creativity. The students she has brought on from MSU at various stages of the project have also been key to the successes we have had up to now.”

Daniel Thiel

Assistant Director
Life Sciences and Society Program
University of Michigan

BUILDING INTERactive environments

Article by Catherine A. Gibson

Rabindra (Robby) Ratan wants you to be happy—and healthy. And he has co-developed urWell™, a free, downloadable software app (compatible with iPhone™, iPad™, and iPod™ touch), to help you get there.

Dr. Ratan's research focuses on the ways people interact with technologies and the behavioral results of those interactions. In 2011, while he was working on his Ph.D. at the University of Southern California's Annenberg School for Communication and Journalism, he co-founded Tech urSelf™ with Belinda Liu, who is now CEO of the San Francisco-based company.

The Tech urSelf™ urWell™ app includes several self-tracking and self-reflection tools aimed at helping people better understand themselves. The app is based on the philosophy that everyone can grow from self-reflection and thus improve their sense of fulfillment, happiness, and well-being.

The urWell™ app is the result of a chance meeting on an airplane between Ratan (when still a Ph.D. student) and Liu in the summer of 2010. During the course of their conversation, Ratan and Liu realized they shared an interest in recording and reflecting on data about their lives, as well as an entrepreneurial spirit. They also recognized that the tools to do the kind of self-tracking, self-reflection, and analysis they were interested in either didn't exist or were inadequate. So they decided to team up and, with some additional technical expertise they hired, developed their own self-reflection software tool.

As Ratan explained it, "urWell™ is about self-awareness, so the technology itself is designed to promote self-awareness, which I think is integral for improving happiness or reducing depression—however you want to frame it—increasing wellness. It's almost as if the technology is intended to turn the user into a personal scientist or their own psychologist. The technology is a life coach. You enter the data and the technology guides you through a path to self-discovery."

According to Ratan, "there's an entire niche of people called the 'quantified self' movement or 'quantified selfers' who will track everything—calories, weight of their food, anything that they can write numbers for, and they go to meet-ups and share their data. They're highly motivated. And I imagine most people are not highly motivated or technologically capable of that level of tracking. So the vision behind the app was to provide easy tracking."

The urWell™ app was officially launched in May of 2013 and has not reached wide distribution as yet, so it is too early for Ratan to evaluate the impact or benefits of it. However, he noted that so far, "the people who have gotten into it deeply say they like it and they do glean insights about their lives."



➤ **Rabindra A. Ratan**
Assistant Professor
Department of
Telecommunication,
Information Studies
and Media
College of
Communication Arts
and Sciences

About the collaboration, Belinda Liu said, "Robby was instrumental in getting our urWell™ lifestyle tracking app off the ground. We co-created the initial design of urWell™ based on his background in mobile gaming and social science research. Robby also developed an elegant solution to calculating and visualizing the user's lifestyle and wellness trends in the app. Because of the simple design and functionality of urWell™, we won a \$40K startup grant with Startup Chile to further expand on the product and share our work with the global startup community in Chile."

Ratan has continued his involvement in this project, providing expert advice on refinements to the software product to Liu and her team of experts from various fields, including wellness experts and the software industry. 🌟

CAR TALK

Improving the Driving World in Tangible Ways

Beyond the urWell™ app endeavor, Ratan sees his role as using the theories he develops about communication in virtual worlds and video games to help create technologies that can improve the world in tangible ways, such as by reducing car accidents.

Currently he is interested in the way people communicate with each other, either through their cars or through in-car social media. Ratan said that, while at the moment, "we can't communicate with others safely when we're on the road, I think this is about to change dramatically both because the car will drive itself—giving us more time and attention available to talk to other drivers—and because the apps that we use on our phones will be geared more toward interactions with drivers and other features of the road."

His "Avacars" project, which focuses on this topic, involves his SPARTIE (Social and Psychological Approaches to Research on Technology and Interactive Environments) research group. The SPARTIE group includes both graduate and undergraduate students and aims to use their research and game development in this area to improve driver safety and efficiency.

With the help of MSU institutional supports such as MSU Business-CONNECT, Ratan is seeking external partners among automobile manufacturers to participate in this research. While getting the right external partner can be a challenge, Ratan remains both hopeful and persistent, and sees the benefits of community engaged scholarship for all parties involved. "I entered academia thinking that everyone works like this or at least this is the best way to do it—work with external partners and try to make an impact on the world," he explained. "I think it makes things a little more fun and meaningful."



Photos by Monir Moniruzzaman

A kidney seller's scar

ETHICS AND POLICY

ORGAN BAZAARS IN BANGLADESH

Article by Linda Chapel Jackson

Monir Moniruzzaman doesn't spend a lot of time debating the finer points of medical ethics. He has little doubt about the morality of the medical practice that he researches, which is trafficking in human organs.

His problem is what to do about it.

The Underground Market

"I've been working on the underground organ market since 2000," said Dr. Moniruzzaman. "Commercialization of medicine and increasing inequality have had a huge impact on the transplant enterprise. Organ transplants have boomed since the 1970s. In the West, waiting lists can be six to seven years, so wealthy people go overseas to get it done. In the East, people live in excruciating poverty, so they sell their body parts to get by. It started with kidneys. Later, livers became new commodities."

Many doctors and hospitals are co-conspirators, as Moniruzzaman found out when he undertook a year-long study in Dhaka in 2005. "Hospitals don't look at where organs come from," he said.

"The first three months I asked around in hospitals...the doctors denied it exists in Bangladesh. They said it was just a problem in India. I started talking to recipients, but they made up stories when I asked to talk to their donors: 'He lives in a remote village, there's no phone,' and so on. They pretended the donor was a family member."

Then a friend said he knew a recipient who had purchased a kidney from a slum dweller. That contact paid off with a confidential seven-hour interview about how the market operates. "The sellers are not connected," said Moniruzzaman. "You can only find them through brokers."

Approaching the brokers, however, was difficult and dangerous. "I approached four brokers. Once I met a broker in a back alley; he came along with thugs and denied his involvement in organ trafficking. Finally, I convinced one broker who agreed to help," said Moniruzzaman.

Once plugged into the brokers' network, what he found was even worse than expected. Most of the sellers, severely impoverished to begin with, were worse off than before. Many were never paid what they were promised, and none received any post-operative care. For most, the money soon ran out and they were unable to go back to work because of lingering health issues from their surgeries.

And, commented Moniruzzaman, "it was difficult to find the data because nobody wants to tell that he sold his organs. It's shameful. It's humiliating. There is stigma involved, and it's illegal on top of that."

But he persisted, and did succeed in infiltrating the market, and in 2012 was able to testify before the Congressional Tom Lantos Human Rights Commission and the Senate Foreign Relations Committee with hard-won data from the first ever in-depth study of its kind. He also published the study results in *Medical Anthropology Quarterly*.¹

Stopping the Exploitation

Having verified and to some degree quantified the problem, Moniruzzaman has now turned his attention to how this brutal and horrific form of human exploitation might be stopped.

"The biggest problem in Bangladesh is the poverty," he said. "The inequality is massive here." For this reason he disagrees with those who want to legalize and regulate the market: "There are some people who still

"There is no cadaveric donation plan in Bangladesh, so people buy and sell live organs. It started with kidneys. Later, livers became new commodities."

Monir Moniruzzaman

¹ Moniruzzaman, M. (2012). "Living cadavers" in Bangladesh: Bioviolence in the human organ bazaar. *Medical Anthropology Quarterly*, 26, 69-91.



The village tea stall is a typical meeting place where organ brokers prey on the poor.



Poverty in Dhaka

“There are many people who still want to legalize organ selling. The argument is the donors will get paid and cared for. But it’s bodily inequality. The commodification of organs is bioviolence.”

Monir Moniruzzaman

want to legalize it, arguing that the donors will get paid and cared for. They fail to understand that an organ market simply prolongs the lives of the affluent few at the severe cost of bioviolence, exploitation, and suffering inflicted against the poor. We cannot legalize a market that promotes bodily inequality; the poor have every right to keep their body parts intact.”

Over the past decade a growing world-wide community has begun to converge around the issue.

In 2004, the World Health Assembly (the decision-making body of WHO) urged its member states to take measures against transplant tourism and address the wider problem of international organ trafficking.

In 2006, representatives from two medical societies, the Transplantation Society and the International Society of Nephrology, met to discuss the idea of developing a formal declaration that would unite and speak for all those engaged in combating unethical practices in organ transplantation.

They laid the foundations for this mission to be carried out two years later at the Istanbul Summit, where 152 representatives from scholarly and medical societies, governments, the Vatican, organ transplantation experts, ethicists, anthropologists, sociologists,

legal scholars, and others met to draft the Declaration of Istanbul on Organ Trafficking and Transplant Tourism.² The Declaration was published in 2008 in the *Lancet* and has since been republished in numerous medical journals and translated into more than a dozen languages.

Moniruzzaman serves as a “custodial” or core member of the Istanbul group, which now examines organ trafficking and promotes ethical guidelines for practice in organ donation and transplant. Since its inception, over 100 countries have strengthened or adopted their laws against organ trafficking. He is also in the process of launching the Organ Union, a non-governmental organization in Dhaka. The Union will map out, monitor, and mitigate the organ trafficking, as well as support the organ sellers, in Bangladesh.

Based on Moniruzzaman’s research, MSU faculty members Sue Carter (Journalism), Troy Hale (Telecommunication, Information Studies and Media), and Geri Alunit Zeldes (Journalism) are making a documentary film to create awareness on this issue.

Dr. Francis L. Delmonico, who is executive secretary of the Declaration of Istanbul Custodian Group (DICG), president of the Transplantation Society, and advisor for human transplantation to the World Health

Organization, said that “Dr. Moniruzzaman has been a vital member of the DICG and has made a unique contribution in the exposure of organ trafficking in Bangladesh. It is the collaboration of professionals such as Dr. Moniruzzaman that has enabled DICG to be effective in combating transplant tourism and organ trafficking throughout the world.”

Moniruzzaman believes that the solution lies in local action, supported by global policy declarations. “The UN took a recent initiative for putting it under human trafficking. But these agreements are international. Local governments are where changes have to be implemented. In Bangladesh, the Minister of Health is taking the initiative to tighten the laws and ensure that papers are not fake, the donor and recipient are actually related, and so on. Almost every country prosecutes organ trafficking, but it goes on. That’s where we are working.” 🌟



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² See declarationofistanbul.org.

SUPPORTING **stronger** K-

“Understanding and using science is not a luxury; it is essential for ensuring that future generations will live in a society that is sustainable and free.”

Our children live in a rapidly changing world where scientific knowledge and technology are evolving quickly. However, the United States lags behind other nations in student understanding of the science, technology, engineering, and mathematics (STEM) disciplines necessary for success in this changing environment. Young people will increasingly face stiff competition for jobs across the globe, and will need a much stronger foundation in STEM areas to help our nation compete in a global economy. Our society has changed to a knowledge driven one; as such, we need to equip our children with the conceptual tools to solve problems, make decisions, and learn more.

Standards Outdated

In the past, science teaching required students to learn many concepts. The unintended consequence of this was that learners did not see how the ideas were connected. They developed only superficial knowledge that many learners could not apply. However, employment opportunities today and in the future will require our children to apply ideas and to have critical thinking and reasoning skills, imagination, judgment, creativity, and mathematical thinking.¹

Our past standards for science education are no longer adequate. Where previous standards focused on helping students acquire content knowledge measured through testing, the new standards instead focus on students engaging in scientific practices through which they experience key ideas and explore crosscutting themes that focus on explaining phenomena and solving problems.

Not every child will grow up being interested in STEM or a career in STEM, but to live a fruitful and productive life, understanding STEM is critical. We need citizens who can make wise choices about the environment, health care issues, energy usage, and socio-scientific issues. Understanding and using science is not a luxury; it is essential for ensuring that future generations will live in a society that is sustainable and free.

A New Framework for Science Education

The National Research Council crafted its *Framework for K-12 Science Education* (2012) to serve as the foundation for the development of new national science education standards. The Framework took the stance that all children in our society need to understand the disciplinary core ideas and practices of science and engineering to serve as conceptual tools for solving problems, explaining phenomena, and learning more.

In April 2013, the Next Generation Science Standards (NGSS) were released.² These new standards are based on a solid foundation of what is known about the teaching and learning of science and what students should know and be able to do to live in the 21st century. Grounded in rigorous science,³ the standards require students to build deep, applied understanding of disciplinary core ideas and practices. Introducing an engineering thread to K-12 education for the first time, the NGSS emphasize knowledge in use so that the next generation of employees can solve problems, innovate, make decisions, and learn and apply new information. This will help our children to compete in a world that increasingly values deep understanding and real production, and ensure that Michigan will meet the workforce needs of a new century.

MSU is National Leader in STEM Education

The CREATE for STEM Institute at MSU is strongly engaged in developing and advancing STEM education research and NGSS in Michigan and beyond. MSU is nationally recognized as a leader in improving teaching and learning in mathematics and science. Two members of the NGSS leadership team and lead writers for the chemistry and physical science standards, Dr. Melanie Cooper and Dr. Joseph Krajcik, are professors with the Institute.



¹ Friedman, T. J., & Mandelbaum, M. (2011). *That used to be us: How America fell behind in the world it invented and how we can make it back*. New York: Farrar, Straus and Giroux.

² See <http://www.nextgenscience.org/>

³ *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas* (2012); *Successful K-12 STEM education: Identifying effective approaches in science, technology, engineering and mathematics* (2011); and *Monitoring progress toward successful K-12 STEM education: A nation advancing?* (2013). All available from National Academies Press at <http://www.nap.edu>

⁴ See the CREATE for STEM website, <http://www.create4stem.msu.edu/ngss>

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“We need citizens who can make wise choices about the environment, health care issues, energy usage, and socio-scientific issues.”

Science Education

Article by Joseph Krajcik and Renee Bayer

Forty-one teachers and educators from throughout our nation wrote, revised, reviewed, and monitored the development of the NGSS. With funding from the Carnegie Corporation, science teachers, scientists, and educators from 26 lead states, including Michigan, provided feedback as NGSS was developed. Even within the 26 states, Michigan’s leadership stands out. Michigan developed a strong team of educators and university researchers that engaged teachers throughout the state in commenting on multiple drafts.

MSU and CREATE for STEM are partners with the Michigan Department of Education, the Michigan Math and Science Network, the Michigan Science Teachers Association, and other state leadership organizations. With these partners, we continue to develop resources for professional development of teachers, administrators, business leaders, parents, and the general public regarding the NGSS.⁴ Science teachers in Michigan are ready to move forward and anxiously await the adoption of NGSS by the State Board of Education.

New Standards are Only the Beginning

New standards, however, are only part of the picture to bring about sustained change to our educational system. Along with the standards, teachers and school systems need new curriculum materials, assessments to monitor student progress, teacher professional development so that science teachers can learn new content and new teaching practices, and new resources—including equipment—for students to explore phenomena. Revision of how K-12 science teachers are prepared at the university level is also needed.

The overall effort is indeed ambitious. Yet, this ambitious agenda brings many opportunities to revitalize our science classrooms to help all children learn science and to develop the conceptual tools to live in an ever-changing global society. We only have to look at the trends in current educational, economic, and environmental statistics to foresee our children’s future—which looks grim if we don’t act to restructure our current science education system. With the release of NGSS we have new opportunities. Our science classrooms will change to prepare our children for the world they live in. Research shows that when curriculum materials incorporating science and engineering practices blended with core ideas are introduced in the classroom, even in the nation’s poorest schools, students rapidly make measurable gains in

scientific learning. We will need professional development to accomplish this; however, our teaching pool is ready, capable, and willing to move forward.

With the release of the Next Generation Science Standards in 2013, we have a once-in-a-generation opportunity to dramatically affect the teaching and learning of science and engineering, building a 21st century workforce with vital long-term economic and development outcomes. 🌱

Joe Krajcik was the lead writer for the disciplinary core ideas in the NRC’s Framework for K-12 Science Education and on the leadership team for developing the NGSS.

Renee Bayer taught environmental and secondary science education before moving into community-based public health research, teaching and practice.

CREATE for STEM is an MSU-sponsored research institute with a broad mandate for collaborative research in education, assessment, and teaching environments for science, technology, engineering, and mathematics. The Institute is a joint endeavor of the College of Natural Science and the College of Education, in coordination with the Office of the Provost.

create4stem.msu.edu



➤ **Joseph Krajcik**
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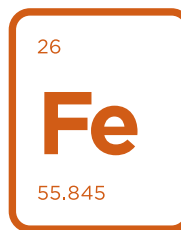


➤ **Renee Bayer**
Associate Director
for Engagement
CREATE for STEM Institute
College of Natural Science
and College of Education

“MSU is nationally recognized as a leader in improving teaching and learning in mathematics and science.”



MICHIGAN STATE UNIVERSITY SCIENCE FESTIVAL



“Our goal was to share the curiosity and excitement that motivates the quest for new knowledge, and ignite that same passion, adventure, and awe in festival attendees.”

Hiram E. Fitzgerald

Associate Provost
University Outreach and Engagement

MICHIGAN STATE UNIVERSITY held its first-ever MSU Science Festival in April 2013, bringing mid-Michigan communities together with MSU scientists in a shared exploration of the science that touches our everyday lives. The ten-day celebration featured topics from astronomy to music to zoology, geared for lifelong learners of all ages.

More than 150 unique activities, ranging from lectures to hands-on activities, demonstrations, guided tours, and music/arts performances, were presented by MSU faculty, staff, and students, as well as a number of community participants. All Festival events were free and open to the public.

For the weekend days of the Festival, the *Lansing State Journal* sponsored an Expo Tent where hands-on activities, especially for families and school-age children, were available. One day at the tent was dedicated to a School Expo Extravaganza Day for school groups only.

Other event locations included the Red Cedar River, a bird netting and tagging site, a mock archeological dig, and many more.

The Second Annual MSU Science Festival will be held April 1-6, 2014. For more information visit sciencefestival.msu.edu.

“We wanted to convey the scientific wonders in our world and inspire the curiosity of all lifelong learners.”

Renee Leone

Science Festival Coordinator



10 days
of science with over
10,000
visitors attending



On School Expo Day:
19 schools
brought more than
1,300
students to campus



150+
science activities,
demonstrations,
guided tours, and
performances

BEST-ATTENDED EVENTS

- Facility for Rare Isotope Beams/
National Superconducting Cyclotron
Laboratory open house
- The Music of Math and the Math of Music lecture
- The Secret Life of Trees hands-on activity
- Science Theatre performances

EVALUATION RESULTS

- Of 412 respondents, 90% said they would attend the next Festival
- Over 75% reported more science knowledge and more positive perceptions of scientists
- Sponsors and presenters came from 78 colleges, departments, centers, and units

2013 MSU SCIENCE FESTIVAL SPONSORS

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University Outreach and Engagement

With this issue of *The Engaged Scholar Magazine* we introduce a new column, *Community Voices*, that will showcase community-university collaborations from our partners' points of view. For this issue we talked to Joan Nelson, executive director of the Allen Neighborhood Center on Lansing's Eastside.

CREATING SUSTAINABLE NEIGHBORHOODS

The Allen Neigh



During the 14 years that Joan Nelson has served as executive director of the Allen Neighborhood Center (ANC), the organization has

matured into a highly focused, strategic powerhouse with a comprehensive array of programs in health, food access, housing, youth development, family support, commercial corridor revitalization, and capacity-building for Lansing's Eastside neighborhood, where the Center is located, and beyond.

Never one to bypass an opportunity, Nelson has made the most of a long series of projects and partnerships with MSU over the years. *The Engaged Scholar Magazine* editor Linda Chapel Jackson caught up with her in July, shortly before ANC opened its new Allen Market Place.

“Joan is perhaps the most remarkable community partner I have worked with, and much of this is due to the organization and community she has helped build. Working with Joan has challenged me to be smarter, more thoughtful, and more useful as a teacher and researcher.”

Jeff Grabill

Chairperson
Department of Writing, Rhetoric,
and American Cultures
College of Arts and Letters

Co-Director
Writing in Digital Environments
(WIDE) Research

LCJ: Tell me a little bit about the new Allen Market Place.

JN: We've had an outdoor farmers' market since 2004. It draws maybe 500 to 850 people a week. The new Market Place is built into an abandoned 5,000 square foot warehouse next to the Center that we designed and renovated. This space will allow us to link mid-Michigan growers with commercial and institutional buyers, have a licensed kitchen, and bring the farmers' market indoors for the winter so we can offer it year-round. It's perfect for all kinds of community events.

Starting in November when we bring the market indoors, we will do concurrent programming in the kitchen. For example, we'll partner with guest chefs who will buy supplies from the day's market and then do samplings with them for market patrons.



Market day at ANC

LCJ: What are ANC's major partnerships with MSU?

JN: We've had so many partnerships with MSU it's hard to keep track of them. As ANC grows and programs expand, other people have taken responsibility for them, so I'm not as close as I was. But we developed it, one person, one department at a time.

Our most enduring partnership—10 years—has been with the School of Social Work. We routinely get two or three interns a year working across programs with our outreach team. They do information, referral, and advocacy. Julie Navarre is our contact there. We got an award as an outstanding field placement site for their MSW/BSW interns.

We work with Karen Casey¹ at the Center for Service-Learning and Civic Engagement. They're a constant source of volunteers who work with the greenhouse, the farmers' market, youth programs, neighborhood cleanups, and so on.

At the Center for Regional Food Systems, Mike Hamm helped us to get foundation and USDA money to support the Market. His colleague, Rich Pirog, is creating a support and funding network for food hubs in the state. (Did you know Michigan is second only to California in crop diversity, but 19th in consumption of locally grown food?) Six hubs have received Michigan Department of Agriculture funding. We are one. Rich hosts a gathering of grantees about once a quarter. This is a very helpful partnership for us.

We've had unexpected partnerships...Rodney Whittaker and the Jazz Studies Program...We were a partner in his proposal to the Greater Lansing Arts Council. MSU premiered four original jazz pieces at Pattengill Middle School over the course of a year, and it was all free for students and community members! I met Rodney when Pete, my son, was in high school and was invited to practice with MSU's Jazz Band 3. Pete graduated from MSU this year in jazz studies.

Steve Gasteyer, from Sociology, does USDA funded research that looks at gardening and health. Steve works with Rita O'Brien, director of our Garden House operations.

¹ CSLCE's director emeritus, retired summer 2013.

“ANC delivers what it says it will deliver, is happy to collaborate to get a job done, and is also committed to measuring and reporting the impacts of activities. When Joan talks, one sees a strong commitment to social justice that is refreshing and infectious.”

Stephen P. Gasteyer

Assistant Professor
Department of Sociology

Neighborhood Center

Article by Linda Chapel Jackson

Over the years we've done projects with the Center for Community and Economic Development, with Rex LaMore and John Melcher. We've presented to students; they've interned with us. We support the "Our Michigan Ave" project.

Jeff Grabill, from Writing, Rhetoric and American Cultures, gives us great interns. They assist with fine tuning our communications.

Overall, we try to be a link via newsletter and social media between MSU and the Eastside. We let them know about initiatives coming out of CCED and other units.

LCJ: What's it like living next door to a big university?

JN: We get constant calls from professors who need a speaker or to work with students on a research project. We also get a lot of calls from graduate students who want to do research in the neighborhood.

So we developed a process to apply for ANC's assistance in focusing research on the Eastside. We ask for information: How will neighbors be compensated for their time and involvement? Will we be able to weigh in on study design or survey questions? Will ANC receive a presentation about the findings? Our board has to approve all research projects in which ANC or patrons of our programs are involved. We're protective of the neighborhood as well as ANC. We advocate for compensation if residents are asked to contribute significant time or effort.

LCJ: Do you have any advice for MSU faculty working with community partners?

JN: Sure. Give us a call about the nature of the project. We like to help shape it. We'll have a preliminary conversation to see if it's a good fit and then follow up with other staff on the specific topic.

Because we're visible and close, MSU usually comes to us. Where we've reached out to them is with respect to food and health related projects. Medical students come out to the market once or twice a year to do screenings. Interns from kinesiology and dietetics programs volunteer in the GardenHouse and in our youth programs that focus on nutrition and fitness education. MSU Student Organic Farm faculty generously provide presentations at our gardening workshops.

It's fair to say, MSU resources—faculty, staff, and students—are enormously valuable to us. It's a rich source of potential partnerships, information, and support for our work. We're happy to be neighbors.

We are committed to helping develop community organizers, community health workers, and social workers with rich, real-world work experiences. It's part of our mission to nurture and train the next generation that will create sustainable neighborhoods. 🌱

“Joan is such a positive, approachable person and always has insights that make our Michigan Food Hub Network project even more effective in supporting food hubs across the state. ANC really stands out as a nonprofit that acts with and on behalf of its community residents.”

Rich Pirog

Senior Associate Director
MSU Center for Regional Food Systems
Department of Community Sustainability
College of Agriculture and Natural Resources



ALLEN NEIGHBORHOOD CENTER

By the Numbers...

- **6 full-time staff, 2 part-time staff, and 3 full-time Americorps members**
- **About 12 interns per year (2/3 from MSU, 1/3 from Lansing Community College, Davenport, and more)**
- **About 350 volunteers a year, 40-50% at any time from MSU**
- **3-5 hours/week for a full semester (the minimal commitment sought)**

Building Character in Young People Through Youth Sports

Article by Carla Hills

Honoring Kinesiology Professor Dan Gould and Think Detroit Police Athletic League

MSU's Institute for the Study of Youth Sports (ISYS) and the Think Detroit Police Athletic League (Think Detroit PAL) have trained coaches and volunteers, evaluated programs, and produced measurable outcomes for thousands involved with youth sports in the City of Detroit. The partnership has now been recognized as an outstanding university-community collaboration.

Daniel R. Gould, professor in the College of Education's Department of Kinesiology and director of ISYS, along with community partner Think Detroit PAL, were named co-recipients of the Outreach Scholarship Community Partnership Award during the annual MSU Awards Convocation in February 2013. Tim Richey, current chief executive officer of Think Detroit PAL, and Dan Varner, founding CEO, represented the organization at the award ceremony.

The partnership began seven years ago between Gould, Varner, and Richey, who was then director of athletics at Think Detroit PAL. At Varner's request, Gould and Dr. Larry Lauer, ISYS director of coaching education, conducted training in positive youth development through sports for a group of Think Detroit PAL coaches. A coaching education program for 1,500 coaches and managers followed, aimed at building character in young people through youth sports. The program has been used to train over 5,000 Think Detroit PAL coaches and managers over the past five years, impacting thousands of Detroit youth.



Daniel Varner, Daniel R. Gould, and Tim Richey

"We share this award with our teams at ISYS and Think Detroit PAL, as well as the more than 11,000 youth, Detroit police officers and community volunteers participating yearly in those athletic, academic, and leadership development programs," said Gould.

Current Think Detroit PAL CEO Tim Richey is an MSU alum who played defender and midfielder on the MSU soccer team from 1989 to 1993. "Our goal is to build character in young people through athletic, academic, and leadership development programs, and Dan Gould, Larry Lauer,

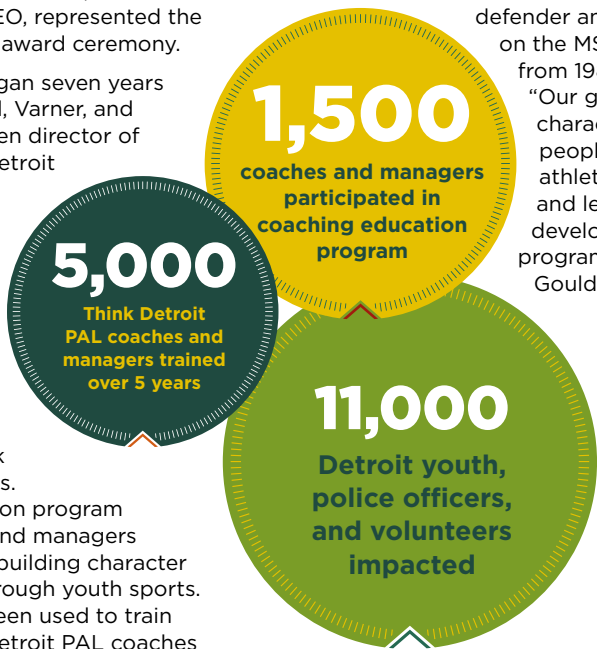
and the entire ISYS team have made significant contributions to our efforts," said Richey. "By listening and working with our staff, coaches, and community volunteers, they have been able to evaluate programs and trainings and help us identify ways to clarify, improve, and communicate our key objectives."

"As a result of our partnership with MSU, we have been able to sharpen our focus and our ability to convey our effectiveness to local leaders, funders, policymakers, and others who believe positive experiences in sports and physical activity can make the difference in young lives," said Richey.

Learn more about the Outreach Scholarship Community Partnership Award and past recipients at outreach.msu.edu/awards/oscpa.

"As a result of our partnership with MSU, we have been able to sharpen our focus and our ability to convey our effectiveness to local leaders, funders, policymakers, and others who believe positive experiences in sports and physical activity can make the difference in young lives."

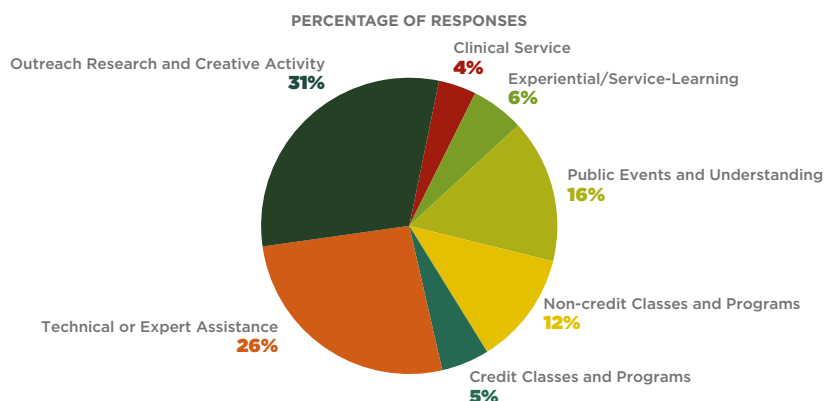
Tim Richey
Chief Executive Officer
Think Detroit PAL



2012 Data Snapshot of Outreach and Engagement at Michigan State University

Sponsored by MSU's National Collaborative for the Study of University Engagement (NCSUE), the Outreach and Engagement Measurement Instrument (OEMI) gathers data about the outreach activities of MSU faculty and academic staff. The information is self-reported and participation in the annual survey is voluntary. Data for 2012 were collected between January and April 2013 and represent the ninth year of data collection; 568 faculty and academic staff responded to the survey. Since 2004, 3,104 distinct (non-duplicative) respondents have reported their outreach and engagement through the OEMI. For this snapshot, OEMI data are augmented with data from the service-learning and civic engagement student registration system.

Forms of Engagement Reported by MSU Faculty and Academic Staff in 2012



OEMI results for 2012 include the following:

\$11,347,469

Value of salary investment by MSU faculty and academic staff in addressing issues of public concern (data from those reporting outreach activities on the OEMI)

95.9%

Respondents whose outreach contributed to achieving Boldness by Design (BBD) imperatives:

75.1% Enhanced the student experience

78.0% Enriched community, economic, and family life

43.4% Expanded international reach

63.7% Increased research opportunities

56.1% Strengthened stewardship

448

Number of specific projects/activities reported

Of the respondents who described specific projects/activities:

84.4% Reported working with external partners

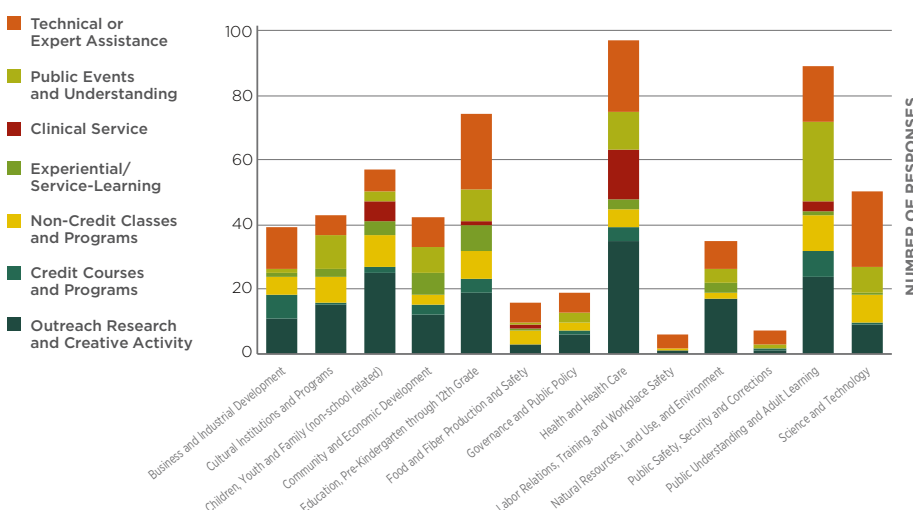
83.3% Reported having created intellectual property and scholarly outcomes

80.5% Reported that their outreach work impacted their scholarly or teaching practices

MICHIGAN STATE UNIVERSITY

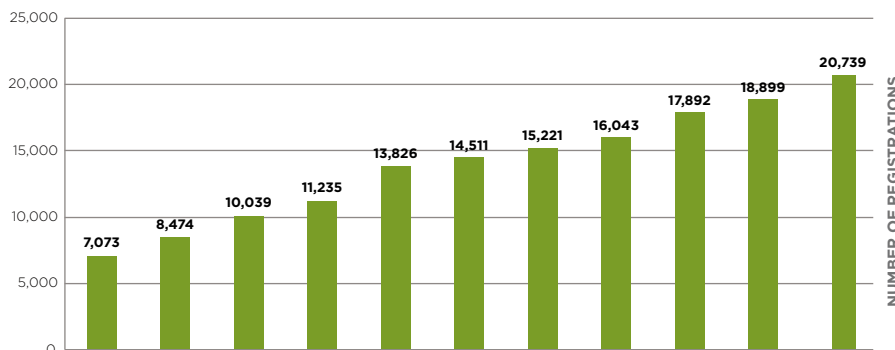
University Outreach and Engagement
National Collaborative for the Study of University Engagement

Forms of Outreach Cross-Tabulated with Societal Concerns for 2012



The number of "responses" is greater than the number of "respondents." Respondents were given the opportunity to describe their engagement activities for up to two areas of social concern; each description was counted as a separate response.

Number of Student Registrations for Service-Learning Received and Accommodated (2002-2012)



Local School Teams Compete in Michigan Science Olympiad State Tournament



Teams from 96 schools statewide participated in the State Tournament of the Michigan Science Olympiad in April 2013.

More than 400 high school and middle school teams competed at regional competitions during February and March, resulting in 96 teams being selected to compete at the state tournament on the MSU campus. Forty-six competitions were focused on a broad range of scientific topics, including experimental design, thermodynamics, remote sensing, chemistry, astronomy, technical problem solving, and forensics.

The 2013 tournament featured a new engineering event for both high school and middle school teams. The Rotor Egg Drop required middle school team members to construct an unpowered, autorotation helicopter device using one or more helicopter rotors to safely transport a raw chicken egg from a specified height to the floor. The high school competitors constructed a self-propelled magnetically-levitated vehicle with battery powered rotors that turned two propellers to move the vehicle down a magnetic track. The Michigan Department of Transportation supported this event statewide with the placement of specially designed tracks for the cars to be tested in schools and regional tournaments.

The top two overall tournament winners in each division, and runner-up teams from each division, competed in the National Science Olympiad Tournament in May.

The 2013 tournament marked the 31st anniversary of the Michigan Science Olympiad, part of an event that is one of the premier science competitions for middle school and high school youth across the United States. Science Olympiad tournaments are rigorous academic competitions for which students and their coaches and volunteers prepare during the entire year. In Michigan, participation has increased from 600 students in the first event 31 years ago to over two million currently.

The Michigan Science Olympiad State Tournament is jointly sponsored by the Office of the Associate Provost for University Outreach and Engagement at MSU and the Dart Foundation.

Awards and Honors

- The Ford Motor Company Fund has awarded \$225,000 in **Ford College Community Challenge** grants to nine colleges and universities in support of service-learning on college campuses. MSU was one of the nine winners, with a grant to support students in the College of Engineering to develop and test a teaching module, software libraries, and cloud support to enable Lansing, Michigan area students to create Java programs that gather information about local energy usage.
- Associate Provost for University Outreach and Engagement Hiram E. Fitzgerald was recognized in March 2013 at the **Kellogg-Paolucci Lecture** for his pioneering research on infant mental health in underrepresented groups using ground-breaking, community-based participatory research methodologies.
- In May 2013, MSU Federal Credit Union and the Residential College in Arts and Humanities announced the first winner of the **MSUFCU-RCAH Dean's Choice Award for Innovations in Civic Engagement**. Emily Nott, a RCAH student pursuing a bachelor of fine arts degree in art education, was recognized for fostering innovation using the arts and humanities in community settings.

Transitions

- **KAREN MCKNIGHT CASEY**, director of the Center for Service-Learning and Civic Engagement, retired in June 2013. McKnight Casey was responsible for facilitating service-based learning and civic engagement opportunities for MSU students. She also served as adjunct with the Department of Human Development and Family Studies, and as field instructor in the School of Social Work. She won a Distinguished Service Award from Michigan Campus Compact in 2013.
- **GARY MORGAN**, MSU Museum director, returned to his native Australia in August 2013. As director of the Museum, Morgan was an energetic advocate for expanding the scope and range of museum programs. In addition to helping build a core museum education team, he initiated programs and partnerships with MSU colleges and departments, including a number of innovative technologies to enhance the visitor experience.
- **LORA HELOU**, the Museum's associate director, has been appointed interim director.
- **CELESTE STURDEVANT REED**, evaluator and engagement specialist with the Community Evaluation and Research Collaborative, retired in June 2013. During her tenure at MSU, Reed worked on youth development, culture and arts, early childhood, community problem-solving, evaluation, and professional development efforts. Most of those efforts focused on building the capacity of evaluation partners.
- **SUSAN L. SHETH** has been appointed as the new director of Gifted and Talented Education (GATE) programs at MSU. Sheth is a doctoral student at the University of Toledo with an emphasis on gifted and talented individuals. She has taught at the University of Michigan - Dearborn. Both Sheth and GATE joined University Outreach and Engagement in September 2013.
- **RENEE MILLER ZIENTEK** is the new director of the Center for Service-Learning and Civic Engagement, effective July 2013. As executive director of Michigan Campus Compact, Zientek worked effectively with over 40 presidents of colleges and universities in Michigan as well as the national Campus Compact. She earned a B.A. in English from the University of Michigan - Flint and an M.A. in American Cultural Studies from the University of Michigan.

About University Outreach and Engagement

University Outreach and Engagement (UOE)

connects university knowledge with community knowledge in mutually beneficial ways.

UOE assists academic departments, centers, institutes, and MSU Extension on priority issues of concern to society by encouraging, supporting, and collaborating with MSU faculty and academic staff to generate, apply, transmit, and preserve knowledge.

Hiram E. Fitzgerald
Associate Provost

Patricia A. Farrell
Assistant Provost for University-Community Partnerships

UOE is supported by the advice of the University-Community Senior Fellows, a council that includes MSU faculty who have distinguished themselves through careers as engaged scholars, as well as leaders from Michigan government, businesses, foundations, and nonprofit organizations.

For a list of Fellows, see outreach.msu.edu/people.

Contact University Outreach and Engagement to learn how you can become more active in the MSU engagement enterprise.

Arts and Cultural Initiatives

C. Kurt Dewhurst, Director

UOE Arts and Cultural Initiatives facilitates research collaborations between MSU faculty and community-based partners using arts and culture to foster effective inclusive communities and cultural economic development.

Center for Community and Economic Development

Rex LaMore, Director

Located in central Lansing, CCED works to improve the quality of life for people in distressed Michigan communities through responsive engagement, strategic partnerships, and collaborative learning.

Center for Service-Learning and Civic Engagement

Renee Zientek, Director

CSLCE provides curricular and co-curricular service-learning and engagement opportunities for MSU students and helps faculty integrate service-learning into their courses.

Communication and Information Technology

Burton A. Bargerstock, Director

CIT provides public access to information about university-wide outreach initiatives through the Internet, as well as consulting and product development services for websites, databases, publications, graphic design, and event management.

Community Evaluation and Research Collaborative

Laurie Van Egeren, Director

CERC provides a hub for university-based evaluators and conducts participatory program evaluation in the areas of education, youth development, early childhood, health, and community development.

Gifted and Talented Education

Susan Sheth, Director

GATE promotes differentiated educational programs for students in grade school, middle school, and high school in order to provide educational experiences that benefit academically able students intellectually, cultivate social relationships, and encourage a global understanding of their world.

Julian Samora Research Institute

Rubén Martínez, Director

Julian Samora Research Institute conducts research on social, economic, educational, and political issues of Latino communities.

MSU Detroit Center

Jena Baker-Calloway, Director

The Center is home to College of Education programs and Detroit internship headquarters; Community Music School Detroit classes, programs, and events; and offices for admissions, advancement, and governmental affairs.

MSU Museum

Lora Helou, Interim Director

The MSU Museum reaches a broad public audience through collections, field- and collections-based research, public service and education programs, traveling exhibits, and innovative partnerships.

National Collaborative for the Study of University Engagement

Burton A. Bargerstock, Director

NCSUE is a national innovator, conducting studies about faculty roles and rewards as well as facilitating conversations on benchmarking, engaged scholarship, and the scholarship of engagement.

Usability/Accessibility Research and Consulting

Sarah J. Swierenga, Director

UARC conducts research and evaluates new interface technologies to ensure that they are useful, usable, accessible, and appealing to a broad audience.

Wharton Center for Performing Arts

Michael J. Brand, Executive Director

Wharton Center educational programs connect students to the performing arts by offering a wide range of programs suited to a variety of learner needs.

MICHIGAN STATE
UNIVERSITY

University Outreach and Engagement
Michigan State University

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and Engagement**

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Michigan State University Outreach and Engagement Calendar

November 14, 2013
World Usability Day
East Lansing, MI
usability.msu.edu/events/conferences

November 18, 2013
**Michigan Pre-College and
Youth Outreach Conference**
Ann Arbor, MI
ceo.umich.edu/2013conference/

April 1-6, 2014
MSU Science Festival
East Lansing, MI
sciencefestival.msu.edu/

April 26, 2014
**Michigan Science Olympiad
State Tournament**
East Lansing, MI
scienceolympiad.msu.edu/

November 7-8, 2014
**25th Anniversary
Celebration Conference**
**Latinos in 2050:
Restoring the Public Good**
East Lansing, MI
jsri.msu.edu/events/25years



Caution: Exposure to science will result in happiness!

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MICHIGAN STATE UNIVERSITY
SCIENCE FESTIVAL
APRIL 1-6, 2014
On MSU's campus
and surrounding community



**EXPERIENCE
SCIENCE
LIKE NEVER BEFORE**

Highlights

- Expo tent features hands-on activities for the whole family (Saturday and Sunday, April 5-6)
- Robert Krulwich, the entertaining co-host of NPR's Radiolab and NPR Science Unit Correspondent, gives the featured presentation (Friday, April 4)
- "Science in the City" where you can visit East Lansing businesses who will feature the science behind their industries (Saturday, April 5, 6-9 pm)

AND IT'S ALL FREE!

For more information visit us online at:
sciencefestival.msu.edu