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This issue of The Western Michigan University Magazine is dedicated to research efforts under way at the University. We are proud to spotlight some of the work our researchers are doing to expand our base of knowledge. Be it in the research laboratory, in the field doing concentrated studies or leading national discussions on the future of the disciplines, WMU faculty are demonstrating strong leadership.

In this publication, what we hope you notice in the stories we’ve selected is the University’s commitment to the partnerships forged to advance these efforts. From education to engineering, from communication studies to physics, from low vision and blindness to green manufacturing and alternative energy, WMU faculty are charting new paths and ways to adapt in a fast-growing, global world.

Efforts continue to transfer this knowledge to industry by commercializing the technology.

We thank our research partners who generously support our research agenda at the University. Research is the heartbeat of a vibrant university. These partnerships with community, industry, funding agencies and sister institutions enhance our efforts to stay on the cutting edge.

We hope you enjoy reading about the continuing tradition of excellence that distinguishes Western Michigan University as a high research institution.

Best regards,

John M. Dunn
President, Western Michigan University

Leonard Ginsberg
Vice President for Research
Focus on Research

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WMU sets its sights on easing challenges for blind pedestrians

*One of the nation’s premier university programs in blindness and low vision studies is putting its resources behind an effort to help pedestrians with visual impairments navigate increasingly complex traffic patterns.*

WMU’s College of Health and Human Services is home to the nation’s oldest and largest university-based personnel preparation program focused on blindness and low vision rehabilitation. One of only about 15 programs in this area nationwide, WMU’s Department of Blindness and Low Vision Studies educates:

- orientation and mobility specialists, who teach individuals with blindness and low vision the skills needed for safe travel;
- vision rehabilitation therapists, who provide instruction to children and adults in activities such as Braille and adaptive communication, daily living skills, and social and leisure activities;
- teachers of vision impaired children, who help to meet the academic needs of school-aged children; and
- rehabilitation counselors, who assist children and working-age adults with vocational issues.

Continuing the University’s long tradition of innovation and research productivity, researchers in the department have been working since 2000 with the largest single research grant ever awarded in the field of orientation and mobility. The $4.2 million grant was awarded by the National Institutes of Health and its National Eye Institute for work aimed at improving the access to complex traffic intersections by adults and children with low vision or blindness.

Work on the initial effort was guided by Dr. Richard Long. The funding supported a set of about 30 research projects in support of the overall effort. Long, professor of blindness and low vision studies and associate dean in the College of Health and Human Services, had three WMU co-investigators on the grant from WMU: Dr. David Guth, professor, and Dr. Robert Wall-Emerson, associate professor, in the Department of Blindness and Low Vision Studies, and Dr. John Gesink, professor and chair of the Department of Electrical and Computing Engineering. With extensions, the initial five-year award ended in May 2007.

In June 2007, the investigators received word that their competitive renewal application was approved. This renewal will provide an additional $4.9 million in funding on the topic of access to complex intersections between 2007 and 2012. In total, WMU has been awarded $9.9 million in research dollars to investigate this topic.

**Nature of the Research**

The research is multidisciplinary in nature, involving traffic engineers, psychologists, and orientation and mobility specialists. Collaborating with WMU are Boston College, University of North Carolina, Vanderbilt...
Under federal law, the American with Disabilities Act mandates that people with disabilities have equal access to public spaces, including the street environment. Long and his cohorts are studying how to identify which roundabouts are likely to be problematic, and investigating how access might be facilitated by the use of low- and high tech-solutions, such as flashing beacons and video-based systems to detect vehicles.

Another potential challenge for pedestrians with low vision and blindness, as well as sighted pedestrians, is the increasingly popular hybrid cars. Environmental and energy groups are urging the Big Three automakers and the general public to invest in hybrids. But with their influx into the mainstream, the challenge for blind and low-vision people is to hear these quiet cars as they approach crosswalks.

Unlike those with typical vision, some blind and low-vision pedestrians cannot visually preview the roadways to see the traffic pattern. They rely on sound cues to determine when to cross the street. Researchers at WMU are working to study how hybrids with their quiet engines impact traffic detection for people with low vision and blindness, and they ultimately will investigate access solutions that will make detection of hybrid vehicles easier.

For more information, contact Dr. Richard Long at richard.long@wmich.edu.
Vehicle design partnership plays to WMU history of industry engagement

A history of connecting with industry and the desire to extend research skills into the automobile industry has led to the creation of a research consortium at Western Michigan University that will result in greener, safer and lower-cost vehicles in the future.

CAViDS, the Center for Advanced Vehicle Design and Simulation, in WMU’s College of Engineering and Applied Sciences, came into being in 2006 when a group of faculty in the college saw an opportunity to offer the automobile industry a more complete set of skills.

“The overall goal of the Center,” says Dr. William Liou, founding director of CAViDS and WMU professor of mechanical and aeronautical engineering, “is to bring WMU, industry and government together to develop applied research which focuses on ground vehicle simulation.”

This collaborative effort allows for risk-sharing and benefit-sharing between the University and industry. It was natural for this center to evolve at WMU Liou says, given the number of faculty who have worked with the auto industry in the past and given the University’s geographic proximity to the auto industry.

CAViDS is the first of its kind in west Michigan, even though the concept has been adopted in other places. Focusing on applied research, CAViDS was founded to provide for breakthrough computer simulation for industry to help develop and maintain more efficient and reliable vehicles in the field.

“The University of Michigan has an Automotive Research Center,” explains Liou, “and other institutions in other states have similar programs. But what sets CAViDS apart from the others is its focus on more applied research.”

Applied research looks at how and if it will work—that is, can it be made into a product? So, based on computer simulation, changes to vehicle design and repair/replacement issues are implemented in response to the vehicle design simulation program.

To facilitate the integration of faculty expertise with industry needs, the consortium was formed with major industry players signing on...
DANA
• Founded in 1905 by Clarence W. Spicer as the Spicer Manufacturing Co., the company remained in its New Jersey startup location until 1928 when it relocated to Toledo, Ohio, and became what we now know as the Dana Corp.
• Dana Corp. is a company that focuses on being an essential partner to automotive, commercial, and off-highway vehicle customers by producing key products such as axles, drive train products, pickup frames, engine bearings, gaskets and brake lines.
• Because Dana designs and manufactures products for every major vehicle company in the world, it had an income of $8.6 billion last year.
• The Dana Corp. now has many operations throughout the world with more than 46,000 employees who are producing more than 60 million cars per year.

EATON
• Eaton was founded in 1911 by J.O. Eaton and his brother-in-law Henning O. Taube and established in Bloomfield, N.J., as a vehicle component supplier.
• Twenty-two years later, the company’s name was changed from Torbensen Gear and Axle Co. to the Eaton Corp. and has since expanded and been headquartered in Cleveland.
• Eaton is the global leader in electrical, fluid power, trucks, and automotive industries, making $12.4 billion in 2006 with more than 61,000 employees.
• The goal of the company is to “make a difference for their customers, employees, shareholders, and the communities in which they work.”
• To help Eaton stay at the top, the company has thought leaders in science, technology, innovation and engineering who develop and deliver new technologies almost every day.

L3 COMMUNICATIONS
• L3 has its headquarters in New York City.
• The company is a leading supplier of products and services in aerospace and defense platforms and also the leading merchant supplier of guidance and navigation products and systems.
• The company employs more than 63,000 people worldwide.
• It is the prime system contractor in aircraft modernization and maintenance
• L3’s major units are Operations and Maintenance; Command Control & Communications; Intelligence, Surveillance and Reconnaissance; Collection Systems and Services; and Training and Simulation.
• L-3 Communications’s major customers include The U.S. Department of Defense and the U.S. Department of Homeland Security.

MANN + HUMMEL
• Founded in 1933 by Jihoceske Papirny and an English producer of filtration equipment, the company was then established in Ludwigsburg, Germany, in 1941.
• Mann + Hummel is a partner to the automotive and engineering industries by producing and marketing air intake systems and filters.
• The company’s main products include air compressors, vacuum pumps, electrical discharge machining, construction and agricultural machinery, and specialty applications. All of these are mainly sold to off-highway original equipment manufacturers, and the aftermarket sector.
• The goals of this company are safety aspects, environmental protection recognition and prevention of errors, and continuous improvement of efficiency.
• Even though Mann + Hummel already has 41 locations and 10,500 employees around the world, it is now concentrating on expanding in the United States, which is the home of the aftermarket operations for the company.
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to be members. Consortium members include Dana Corp., Eaton Corp., L-3 Communications and MANN + HUMMEL USA. Also involved in the consortium as an affiliate is the U.S. Army Tank-Automotive Research, Development and Engineering Center of the Department of Defense—known as TARDEC—and the National Transportation Research Center at Oak Ridge National Laboratory.

Each industry player pays a membership fee (in 2007, each industry member paid $34,125) that goes for the development of breakthrough applied computer simulation. TARDEC, as an affiliate in the consortium, does not pay a membership fee.

For 2007-08, TARDEC awarded $788,000 to CAViDS as a center to conduct applied research for military applications. One Department of Defense project that CAViDS is developing involves the design of a computer simulation technology which can be used to assess the reliability of a ground vehicle in battlefield conditions. By altering the vehicle in simulations and testing its performance upon impact, data will indicate if the addition of protective armor can withstand the impact of a roadside bomb—something that has direct implications for wartime applications. The application of such data has the potential to impact military decision-making and equipment specifications and, ultimately, can help save lives and money.

“Once validated, computer simulation is more cost-effective versus field testing and experimentation,” says Liou. “What we have already learned from our computer simulation technology has yielded changes in auto design and has had military applications. Industry members have seen value and have seen the results of working together with the consortium. Long term, we hope to see even more commercial applications and military applications.”

If CAViDS can impact the industry through this research, the results will include better products and better prices for commercial users, says Liou. This means greener cars and safer military vehicles.

The benefits for WMU are huge. CAViDS serves as an avenue by which to bring industry needs to University faculty and invigorate, promote and augment the research of faculty and students. Because WMU is an educational institution, housing CAViDS at the College of Engineering and Applied Sciences affords students opportunities to become involved in applied vehicle research.

“This generation today,” observes Liou, “has grown up in the computer age and thus they are more receptive to things on the screen. In short, they can relate easily to computer simulation.”

Long term, offering students access to learn and participate in this research can serve to recruit and retain graduate and undergraduate students at WMU.

WMU historically has been involved in community efforts to improve the quality of life and economic vitality of Michigan’s
The WMU Parkview campus, home to the College of Engineering and Applied Sciences and the University’s Business Technology and Research Park, celebrates its fifth anniversary this year. Part of the BTR Park’s success rests in its ability to connect community and industry needs with the resources available from faculty research and expertise.

Reflecting long-term about CAViDS’ future, Liou thinks that the Center will help to keep engineering and knowledge-based jobs here in Michigan.

“The Center’s activities can help keep work here instead of outsourcing (outsourcing) it to China and other up-and-coming industrial countries,” says Liou.

These are worthy outcomes given the need in Michigan to transition its workforce from manufacturing to a technologically based economy, he notes.

For more information, contact Dr. William Liou at william.liou@wmich.edu.
Green manufacturing answer to environmental and energy concerns

At Western Michigan University, renewable resources and green manufacturing have emerged as major areas of focus for the Manufacturing Research Center.

For five years, Dr. John Patten has played a three-part role as director of the research center, chair of WMU’s Department of Manufacturing Engineering, and a visionary for green manufacturing in Michigan. A lifetime advocate for renewable and alternative energy, his arrival at WMU neatly coincided with an event that triggered an awakening to the need for change. He arrived shortly before a massive power outage in August 2003 that affected much of the Northeast United States.

“Green manufacturing brings the environment, energy and waste together under one umbrella,” explains Patten. “Because WMU has a tradition of working with industry, that’s exactly what I began to do when I arrived here in 2003.”

Patten met with 30 industrial companies to tell them about Western’s Manufacturing Research Center. And, without fail, green manufacturing resonated with them.

“Doors swung open,” recalls Patten, “in large part, because of that August 2003 electrical transmission malfunction on the grid that led to a blackout that covered a large portion of the Northeast United States, including large areas of Michigan.”

The blackout of 2003 was a massive power outage affecting eight states. It left nearly 40 million people in the United States without power, and the financial losses were staggering.

“That was a pivotal moment,” says Patten. “With the electric grid—the energy supply domain—exposed as antiquated, I found it easy to get an audience and letters of support.”

Besides impeccable timing, Patten also brought to WMU years of experience as head of the Manufacturing Engineering Technology program at the University of North Carolina, Charlotte, and his experience as a resident of Japan, where environmental issues figured prominently into the cultural consciousness.

To understand “green manufacturing,” however, Patten says the average consumer needs to understand and appreciate the design process as it takes place in the modern manufacturing and engineering disciplines.

Green manufacturing starts with the design process and an assessment as to whether each step in the process meets the “green” standards. The assessment starts with the materials. Are they biodegradable, renewable and recyclable?

Second, as the design process evolves, engineers look at the product to assess if it is functional, cost effective, and if, at the end of the product’s life, is it easy to disassemble and reuse.

Third, in green manufacturing, the question asked is this: is the product manufactured in an environmentally benign and energy conscious way?

For the average consumer, the application of the green design process is most commonly experienced
For example, Consumers Energy offers its customers the option to participate in a Green Generation Program in which they may opt to pay more to have the energy to their homes or businesses supplied by renewable sources of energy.

What energized the design and manufacturing industries to engineer products in environmentally benign ways may well date back to the very events that personally impacted John Patten and got him started down the green manufacturing road: Earth Day in the 1960s and the oil embargo in 1973. From these events precision engineering emerged and industry faced some fundamental issues: environmental compliance, energy conservation and waste management.

Patten also brought to WMU a strong research record and history with grants. Upon his arrival in Kalamazoo, he started an Industrial University Cooperative Research Center, for which he has been seeking National Science Foundation support.

His most current work involves focusing on renewable resources as the link between energy conservation and environmental preservation. He also is at work on other research that impacts manufacturing processes. (See story on page 11 about Patten’s Micro Laser Assisted Machining, an invention funded by a Michigan Universities Commercialization Initiative grant.)

“Let’s be environmentally benign and energy conscious and design products and processes for the 21st century,” says Patten. “Energy and environment are mutually inclusive.”

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Toward that end, he says, the focus must be on reducing energy consumption and using whatever we have more efficiently, even as we continue efforts to reduce pollutants and waste. This is where renewable energy—what some refer to as alternative energy—becomes the hot ticket item in manufacturing industry as a tool to reduce pollutants and waste. Certainly, the subtext for green manufacturing is this idea of exploring renewable resources.

Committed to an alternative and renewable energy initiative, WMU has joined forces with Michigan State University, Wayne State University, University of Michigan and Michigan Technological University. The five are partnering as Michigan's research universities to establish a Consortium for Advanced Manufacturing of Alternative and Renewable Energy Technologies. Being educators of the next generation of researchers, these five partners are changing the face of the future.

“We now have a generation educated about green manufacturing,” says Patten. “Instead of a line in the textbook mentioning green manufacturing as a factor to consider in assessing environmental impact of design manufacturing, we have entire books and conferences dedicated to the topic.”

Illustrating the potential of alternative energy, a 45-foot wind turbine now graces the Parkview campus near the College of Engineering and Applied Sciences building. Installed in July and dedicated formally in September 2007, the turbine produces 2 kilowatts of power, providing a fraction of the electrical power WMU needs daily, but enough to power a typical home in the Kalamazoo area.

“Wind generates no waste,” says Patten. “It is clean. It is considered a green energy source. It is environmentally friendly as it generates no pollution.”

Active in fundraising, Patten is committed to securing the resources that will lead to having more turbines and bigger structures installed at WMU. And he is committed to educating others on the value of wind as a renewable, alternative source of energy. Leading by doing, Patten sees a shift in the way Michigan uses renewable sources of energy. He will continue to lead the charge as he serves on six statewide committees and advises numerous organizations and companies about the future of wind turbines, particularly in Michigan.

“Given the dual nature of green manufacturing with its environmental and energy components, it is here to stay,” he predicts. “We will see more and more options for the average consumer to join in the efforts of energy companies to increase their reliance on renewable energy.”

For more information, contact Dr. John Patten at john.patten@wmich.edu.
State grant funds micro laser machining technology

A $50,000 grant from the Michigan Universities Commercialization Initiative is helping WMU’s Dr. John Patten perfect an invention that will lead to increased manufacturing productivity.

Patten is using the 2007-08 MUCI grant for work on his Micro Laser Assisted Machining—µ-LAM—device and system, which improves manufacturing capability by addressing roadblocks in major market areas.

The technical aim of the grant-funded project is for Patten to design and build a commercial prototype. This prototype will produce test parts for demonstration, analysis and evaluation of the technology and its capabilities.

MUCI grants are an important step in the road from research to invention to commercialization. In this case, Patten’s idea was generated by university research partially funded by National Science Foundation grants.

NSF grants offer funding for researchers to test an idea or principle through basic or applied research. However, when additional research needs to be done to refine a concept into a prototype or to prove the concept under different conditions, MUCI challenge grants provide money for the development of university technologies for the business sector.

Patten’s MUCI challenge grant is the first competitive MUCI commercialization grant WMU has received. It underscores the practical applications of research being done at WMU.

Patten found from his research a need to achieve greater capability and higher productivity in the manufacture of products, particularly in the high-tech areas of microelectronics, optics and advanced engineering materials. The need drove the search for innovative processing techniques, and Patten’s µ-LAM is one result.

The µ-LAM device and method will be used for precision machining of advanced materials and products in the mechanical (automotive and aerospace), electrical (microelectronics) and optical industries. The device will increase productivity and help to control the cost and quality of semiconductors and ceramic materials and components, which are difficult to machine with current methods. The µ-LAM device and method also will assist manufacturers in their efforts to develop and market processes and products, utilizing these materials, in a cost efficient and competitive manner.

Once the technology is adopted for industry, it could result in the introduction of a host of new products and inventions that implement semiconductor materials in redesigned or new products. Today these materials are mainly limited to high-cost components in the military/defense, automotive, and aerospace industries. The µ-LAM will significantly reduce the cost of manufacturing products from these materials, making them suitable for consumer products currently unavailable due to high production costs.

MUCI grants, like the one awarded to Patten, are designed to develop early-stage technologies often found at research institutions. Mature technologies that develop as a result of these projects are then tested and proven for an industrial base of end users, resulting in the deployment of fully functional systems and other technologies from the university laboratory environment to a commercial business as part of the technology commercialization process.

Once support is secured for the commercialization of the technology, industry end users can benefit fully from the research and development performed at WMU by utilizing it in the commercial sector.

To support such efforts at WMU, the University’s research office has established a Technology Development Fund to help develop and refine new technology. Information about the fund can be found at www.wmich.edu/research/technology.

For more information about micro laser machining technology, contact Dr. John Patten at john.patten@wmich.edu.
The year was 2003. Gov. Jennifer Granholm was desperately looking for ways to keep displaced Pfizer workers in the Kalamazoo community. She turned to WMU for help, and so was born WMU’s Biosciences Research and Commercialization Center.

The BRCC aims to turn the latest bioscience discoveries into new processes and products for the commercial pharmaceutical and scientific market, tapping into the expertise of former Pfizer scientists and other top researchers from around the nation. The center received final authorization from the state’s Technology Tri-Corridor Steering Committee on Dec. 1, 2003, when members approved a five-year business plan and signed off on $10 million for use in launching the effort.

Originally located at William McCracken Hall on the main campus of WMU, the BRCC has its headquarters at the Southwest Michigan Innovation Center, a life sciences incubator and wet lab facility located at WMU’s Business Technology and Research Park.

The SMIC houses the BRCC’s central administrative offices and more than 9,000 square feet of state-of-the-art laboratory space. In addition, the BRCC and its scientists have the potential for collaborative access to about 150 laboratories on WMU’s main and Parkview campuses, and use of WMU’s animal facility.

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Clinical and non-clinical testing services are available in Kalamazoo through BRCC affiliations with Jasper Clinical Research & Development and MPI Research, an internationally regarded contract toxicology research laboratory.

**What the BRCC does**

The BRCC provides business support services and an environment where scientists can be around people in the same profession. The center coordinates research activities and provides an organizational home for scientists as they work to establish new businesses, obtain extramural funding for research, and develop a center of excellence for pharmaceutical development and to support commercialization of the life sciences in Michigan.

According to Executive Director Jack Luderer, “The BRCC helps to commercialize life science discoveries entering the commercialization phases of development in order to benefit society and is a place where you can share frustrations and successes about your work.”

Luderer was highly involved with the creation of the center, helping to develop the structure and business plan. Originally vice president for research at WMU, Luderer was appointed by the BRCC Board of Governors as executive director of the BRCC in 2005.

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**Western Michigan University Business Technology and Research Park**

Western Michigan University's Business Technology and Research Park, adjoining its College of Engineering and Applied Sciences complex, is one of the nation’s fastest growing university research parks.

Ground was broken for infrastructure development in November of 1999. At that time, it was estimated the build-out for a project of this size would take between 8 to 12 years.

In less than seven years, more than 85 percent of the 137-acre BTR site has been developed, is under construction or is under option.

Currently 30 separate private-sector resident partners call the BTR Park home, including 16 life-sciences companies, 12 advanced engineering firms and two information technology companies. A number of the life science firms are startups, housed in the Southwest Michigan Innovation Center, a high-tech/wet lab business incubator. The University's Bioscience Research and Commercialization Center is in this facility as well. All of these entities partner with the University in its core missions of research and instruction.

The WMU BTR Park has been designated a SmartZone by the Michigan Economic Development Corporation. As such, state legislation allows for a portion of the tax revenues generated by resident companies to be returned to the project for infrastructure upgrades. Currently, that figure approaches half a million dollars annually.

An original $37 million capital outlay appropriation from the state to WMU for an upgrade to its College of Engineering facility was leveraged into a project which has surpassed $150 million.

At this time, the University is in active discussions with no less than four additional potential park occupants, two of which are exploring the possibility of new construction on the remaining acreage.

For more information on WMU’s BTR, contact Bob Miller, associate vice president for community outreach, at bob.miller@wmich.edu.
The BRCC supports promising new life sciences ventures entering the commercialization phases of development in a number of ways:

- Startup and gap funding assistance is available through the BRCC for promising new ventures.
- BioLaunch pharmaceutical development services are available to launch new pharmaceutical, device and diagnostic companies.
- The resources of the Core Technology Alliance, a collaborative network of technologically sophisticated core facilities that enhance life sciences research and product development throughout the state of Michigan, are available through the BRCC, which brings pharmaceutical commercialization expertise to the alliance.
- The BRCC receives external oversight and advice from scientific, business and academic experts on the center’s governing board of directors.

Partnering with the state

The BRCC is a member of the Core Technology Alliance, the mission of which is to enhance life sciences research and product development throughout the state of Michigan. Other strategic partners include life science research units at the University of Michigan, Michigan State University, Wayne State University and the Van Andel Institute and others.

“Knowing that your contribution to the economic development of the state can make a difference, and building an intellectual quality of life in Kalamazoo is the most rewarding part of my job,” says Luderer.

Although many of the attempts made in the BRCC could fail, Luderer believes that it is the most rewarding for those who succeed and are able to take advantage of the discoveries made at the BRCC.

“The challenge is continuing finding capital and recruiting people to come to Kalamazoo,” says Luderer.
Recent headlines show the growth and promise that BRCC-supported companies bring to the Michigan pharmaceutical arena.

“Local Company Receives $1M Grant from the National Institutes of Health to Fight Cause of Cervical Cancer”*

“BRCC firm sets milestone, moves to human testing for new drug”*

“Meditrina Pharmaceuticals, Inc. Initiates Phase II Trial and Raises $4.4M in Initial Funding”*

* To read the full stories, go to: www.brcc.wmich.edu/news.asp
Early reading is goal for preschoolers in Battle Creek program

Despite today’s technical mindset and the predominance of computers, video games, iPods, iPhones, and interactive video games like Wii, there is no shortage of research focusing on the ABCs and the fundamental question of how we communicate. A team of Western Michigan University researchers is bringing its expertise to the issue by promoting literacy among pre-school children in a nearby community.

In fall 2006, Western Michigan University researchers were awarded a three-year, $3.4 million grant from the U.S. Department of Education as part of the Early Reading First Program to promote literacy in preschool children in Battle Creek, Mich. Their work focuses on the fact that despite the reach of information technology, the need for literacy remains paramount in an information-based society.

The WMU research team says compelling research in early childhood literacy, reading and child psychology supports the basic premise that children’s success is directly related to the amount of language heard and the flow of words from activities like reading and conversation. The overriding assumption of the “No Child Left Behind” legislation, they note, is that society

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has an obligation to teach every child. And while some children may have special needs or special challenges that hinder them in their educational endeavors, these should not curtail efforts to educate them.

In fall 2007, a WMU Magazine writer sat down with two of the researchers, Dr. Esther Newlin-Haus, director of the Early Reading First Program in Battle Creek, and co-principal investigator Dr. Kristal Ehrhardt, both from WMU’s Department of Special Education and Literacy Studies, to inquire into the Early Reading First Reading preschool center in Battle Creek. The first five-week summer program was winding down, and the pair provided an update on the grant’s successes.

With almost 400 children, ages 3 to 5, involved in the program, the grant is making an impact on the literacy instruction for preschoolers in the city. Of the 400 children enrolled in the center, almost 95% live in poverty. The challenges, the researchers say, include coaching the families on how to introduce literacy and language skills to their children while supplying them with the tools they need to do so.

The grant’s funded activities include parent workshops in which program leaders can share, encourage and offer parental advice on how to expand on the program’s goal of teaching preschoolers specific literacy skills like letter recognition. Employed are simple techniques that provide parents with activities to use at home and on outings like trips to the grocery store.

By coupling with Head Start, which is designed to reach at-risk children, the Early Reading First Program is an attempt to close the gap between this group and the general population at the K through third-grade level. Both Newlin-Haus and Ehrhardt note that most parents want the best for their children and desire to provide them with the tools to succeed in life. Early Reading First does that by giving children specific academic skills to succeed and the self-confidence needed to try.

While the data is yet to be analyzed from this past year’s efforts, Newlin-Haus says anecdotal evidence suggests that many more children know their letters than was the case when the grant work began. That spells success upon which to build.

“Reading is everything,” notes Newlin-Haus. “It is the key to academic success, for getting a job. If you cannot read, you cannot succeed in school; it’s that simple.”

The research team also includes co-principal investigators Drs. Karen Thomas and Shaila Rao, also from the WMU Department of Special Education and Literacy Studies. They join Newlin Haus and Ehrhardt in providing professional development to the Head Start
teachers. Other team members are Lori Farrer, an instructor in WMU’s Department of Family and Consumer Sciences, along with Patti Cornelius and Dr. Carmen Cornielles-Domanico, who serve as literacy coaches.

The work of the literacy coaches has focused on curriculum, print-rich environment, writing centers, and ensuring that every center in the classroom is literacy rich. Coaches spend a half-day each week overseeing four classrooms, facilitating the progress taking place.

In recounting their work to secure the DOE grant, Newlin-Haus and Ehrhardt both emphasize that grant writing takes diligence and commitment. Their grant was not accepted the first time submitted, but the feedback was vital in helping them understand the role partnership building could play in securing the grant. As an example, they cite the work they needed to do with both WMU and Kellogg Community College to secure credit for the teachers who participated in the professional development aspect of the Early Reading First Program.

The grant utilizes research-based strategies to introduce preschoolers to books, vocabulary, the concept of letters, sounds, and writing. With the implementation of the program, the researchers evaluate progress of the project, assess the teachers and offer them tools to self-correct.

Referencing the 1995 book, Meaningful Differences in the Everyday Experiences of Young American Children by psychologists Drs. Betty Hart and Todd Risley, Ehrhardt emphasizes the role vocabulary plays in later academic success.

“The number of words—not merely the complexity of the words—but the actual number of words spoken to a child impacts their language and literacy development as early as kindergarten,” says Ehrhardt. “Unless we provide literacy-rich experiences to low-income, low-education families, there stands the real chance that these children will never catch up to their peers.”

Early Reading First exists to close that achievement gap that happens before kindergarten, according to Ehrhardt.

“It is never too early to start working to improve children’s literacy competency,” she says.

For Newlin-Haus, Kristal Ehrhardt and the rest of their WMU team, the other key ingredients to promoting literacy are passion, skill, persistence, and empowerment. They’re ready to supply those in their fight for early childhood literacy.

For more information, contact Drs. Esther Newlin-Haus and Kristal Ehrhardt at esther.newlin-haus@wmich.edu and kristal.ehrhardt@wmich.edu.
She’s out to double the number of women in physics

One of Western Michigan University’s most accomplished scientists is using her international reputation to further the national goal of doubling the number of women in physics by 2022.

Dr. Nora Berrah, professor of physics, is an active scientist and researcher who has attracted nearly $5 million in research funding since 1992. An internationally recognized scholar who uses her research to inform her teaching, Berrah studies the interaction of light and matter to better understand and control the properties of matter.

With more than 145 publications to her credit and 135 invited presentations at national and international meetings as well as at universities and national laboratories, Berrah combines her teaching and research efforts at WMU with her national and international research at the University of California’s Berkeley National Laboratory; at the free electron laser in Hamburg, Germany; and with her efforts at Stanford’s Linear Accelerator Center, one of the world’s leading research laboratories.

Berrah is especially excited about her latest efforts at Stanford using the Linac Coherent Light Source free electron laser—FEL.

“This x-ray FEL light, the first of its kind in the world, promises to have a huge scientific impact,” says Berrah, who is the co-team leader for the Atomic and Molecular Physics community using the facility.

According to the Stanford center, the applications for this x-ray free science are limitless: medicine, electronics, biology, solid-state physics, nanotechnology, energy production, and as yet undiscovered areas of application.

The Department of Energy funds over $400 million for the ultra-small and ultra-fast laser LCLS light at Stanford, including a suite of instruments, that offers the promise to use time-resolved measurements on all form of matter: from atoms to molecules to aggregates, including biological specimens such as proteins and viruses all the way to the solids. Berrah is involved in the design of the AMO instrumentations.

For her students, especially at the graduate level, Berrah’s involvement with these technologically advanced labs means the latest in atomic and molecular physics makes its way into their WMU classrooms and labs.

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Her passion for science, for teaching physics and for research in atomic and molecular physics is contagious. It is matched only by her willingness to serve her profession. Now she is using her international reputation to focus attention on the nation’s need to recruit and retain female scientists in academe.

National workshop fuels gender equity efforts

Berrah is at the forefront of an effort by the scientific community to assess the current status of women in science, technology, engineering and math, collectively known as STEM disciplines. She’s a proponent of doubling the number of women in physics in the next 15 years. To that end, she recently worked with a colleague from Stanford University, Dr. Arthur Bienenstock, to co-chair a national workshop, held at the American Physical Society headquarters in Maryland. The Committee on the Status of Women in Physics, led by Berrah, as well as members of the broader scientific community, assisted in the planning and organization of the national event.

The title of the event was the National Workshop on Gender Inequity: Strengthening the Physics Enterprise in Physics Departments and National Laboratories. Its purpose was to address and examine the underlying reasons for the small pool of female physicists, which impacts adversely the national scientific workforce. Department chairs of 50 top research-oriented physics departments in the nation attended the event, along with 14 managers of physics-related divisions of national laboratories.

“Women often make sacrifices and give up having a family,” says Berrah. “It used to be and is still, to some extent, too hard to do both well. And the culture is such that one who does have a family risks having it questioned whether, as a female faculty candidate, she can do research, publish and raise grants. This is still in the mind of many academic and national laboratory administrators.”

The workshop on gender inequity sought to address these issues. Social scientists were invited to attend the workshop to discuss biases.

“The goal was to recognize the biases so that we can deal with them and eliminate them,” says Berrah. “The tone was a positive one; we wanted to provide tools to implement change, not point fingers.”

“Another goal was to convince leaders of institutions that actions need to be taken now to double the number of women in physics in the next 15 years,” says Berrah. “We produced, collectively, a set of recommendations that are already on the CSWP website.” (See http://www.aps.org/programs/women/workshops/gender-equity.cfm.) A full report will be distributed to all physics departments in the country in 2008.

The recommendations from the workshop focus on how to change the culture and how to change the infrastructure to affect the current national figures that shows only 8 percent of physicists at major research institutions and only 13 percent of physicists nationally are women. A diverse and increased pool of talent is important for the scientific workforce development, notes Berrah, since the U.S. is on the verge of slipping behind Europe and Asia in workforce development and in the number of scientific breakthroughs.

“Now, with recommendations already on the APS website, and included in the report to be sent out in 2008 to every physics department in the U.S., chairs and managers will have specific recommendations to follow,” says Berrah. “They can be agents of change and many of them are willing to do the right thing.”
Funding for the workshop was secured through the National Science Foundation and the Department of Energy, with awards to Berrah of about $200,000. Supporting the workshop were representatives from a number of federal funding agencies. They included Tony Chan, assistant director of the NSF Directorate for Mathematical and Physical Sciences and Patricia Dehmer, associate director of Science for Basic Energy Sciences and acting deputy for programs at DOE’s Office of Science, who participated in the discussions, panels and presentations.

Understanding Berrah’s commitment

Berrah’s passion and commitment to the goal of increasing the number of women in the hard sciences stem from her own experiences. She says they helped shape her vision for the next generation of women scientists.

Berrah recalls as a child having an innate curiosity. She always wanted to understand how things worked, especially things of a biological nature.

“I read science books and religiously watched science documentaries,” recalls Berrah. “To me, it was like a puzzle to crack.”

While the books and documentaries started her on her journey into science, it was a visit to a university setting that cemented her interest in science.

“When I was in middle school, I visited my brother-in-law, a physicist, at his lab. My observations of his work impacted me,” says Berrah. “I was attracted to it all—the big computer in a separate room—and saw it all as fascinating. I also realized that studying physics was a way to understand the world.”

Because she earned excellent grades in math, physics, and chemistry, her teachers assigned her to the science track in high school. After receiving her baccalaureate in the hard sciences, Berrah segued into physics with hopes to do research. Berrah describes her personal experiences as a female physicist as mostly positive.

“I have heard different stories from other women,” she says. Some of those stories still come to her today as she mentors to younger women in the physics field.

The culture of an academic life in the sciences, especially physics, is competitive and can be demanding and aggressive, she notes. Physics is a man’s club, and the work calls for 12- to 16-hour workdays. This is the culture that must change, she says. Women add to the diversity of the sciences, but the need to incorporate their needs for work and family are real issues that, if not adequately addressed, will continue to undermine the number of women actively pursuing the hard sciences as career choices.

Asked why she is a leading advocate to increase the number of women in physics, Berrah responds by saying, “Today, I am in a position where I feel I can tackle effectively this important issue. Gender inequity in the hard sciences, not just in physics, needs to change.”

“It is a service to the physics community, to the community at large and to society,” she adds, “since I hope that our national activities will allow middle school girls to not be inhibited and to not have the barriers that many of us had to jump. They should be part of the next generation of scientists.”

For more information, contact Dr. Nora Berrah at nora.berrah@wmich.edu.
Media influences adolescent girls’ views on science

The fact that few women choose careers in science and engineering has led researchers to study the reasons why girls as young as middle school age lose interest in science courses and turn away from science and engineering as future careers.

Dr. Jocelyn Steinke, a professor in Western Michigan University’s School of Communication with a joint appointment in Gender and Women’s Studies, is pooling her expertise with that of researchers at other academic institutions and research assistants at WMU to define how the media affect adolescent girls’ perceptions of science. Steinke specializes in research on science communication and explores the influence of media images of women scientists and engineers on adolescent girls’ perceptions of gender roles and their occupational aspirations.

“Research shows that girls start to lose interest in science around the age of 12,” says Steinke. “This is a decline in interest, not ability.”

“Investigating how the media influence young girls’ perceptions of science and careers in SET is important sources of influence for them. Research shows that, for some girls, their self-esteem also wanes at this point and they turn to the media to find answers to the questions “Who am I?” and “Who do I want to be?”

Steinke sees three primary factors as underlying causes for the scarcity of women in SET.

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Steinke sees three primary factors as underlying causes for the scarcity of women in SET.

“I believe it is a combination of factors that begin to work during the early years, and when there are few interventions in place to counter these factors, girls may lose interest in science” reports Steinke. “The three primary factors identified as influencing girls’ interest in SET are: the home environment and parents, schools and teachers/peers, and popular culture and the mass media.”

Media effects on youth, in general, and young females, in particular, are well documented. Boys and girls grow up seeing images of women and men on television. These images cumulatively influence the way youth think about male and female roles.

Why this occurs is the focus of Steinke’s research and grant work with the National Science Foundation.

“Studies emphasize the importance of role models for youths. This means that, for female adolescents, the absence of female science role models in the media may contribute to the factors that influence their perceptions of viable career paths.

“It is important to look at middle school students’ perceptions of female scientists in mass media,” says Steinke, “because the media present roles for women that may influence girls’ perceptions of which roles are considered appropriate or acceptable for women.”

Female middle school students are at an age when the media are important sources of influence for them. Research shows that, for some girls, their self-esteem also wanes at this point and they turn to the media to find answers to the questions “Who am I?” and “Who do I want to be?”

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“It is important to look at middle school students’ perceptions of media portrayals of scientists,” says Steinke, “because these portrayals may shape their perceptions of who can be a scientist.”

If researchers can begin to understand the experiences and perceptions of adolescent girls, perhaps they can
recommend the types of positive images of women scientists that promote girls’ interest in SET.

“Some of the gender counter-stereotypes we see in television portrayals of women scientists show them as intelligent, capable, successful, and interesting,” says Steinke. “Other gender stereotypes of women show them as dependent, not as capable as men, more interested in romance than careers, and unable to balance work and family responsibilities.”

With the first grant, Steinke went into middle schools in Michigan to evaluate the effects of an intervention focused on creating awareness of the stereotypes and counter-stereotypes of women, working women, and women in SET careers featured in media portrayals in television programs and films. The findings were interesting.

“One of the primary findings from the media influences grant was that middle school-aged boys who reported that media were important in their lives were also likely to report negative perceptions of women in SET,” remarks Steinke.

“When asked to draw a picture of a scientist, boys were more likely to indicate the scientist was male, and represented more stereotypes of scientists, in general, than did girls,” said Steinke. “In addition, both female and male students acknowledged that television programs and films were important sources of information for the scientists they drew.”

The first grant’s findings led Steinke to the current NSF grant now in progress. This research project, “Adolescents’ Identification with Female and Male Scientist Characters,” focuses on exploring middle school students’ perceptions of specific scientist characters in popular television shows.

“It is important,” says Steinke, “to look at the media programs that middle school-aged students are currently watching.” (Those programs run the gamut from CSI and Friends to MythBusters and Bill Nye the Science Guy.)

Based on students’ self-reporting of what shows they watch and current listings of popular science shows, the second NSF grant examines 14 television shows that feature scientists.

“Our first goal is to document specific attributes and traits of scientist characters and our second goal is to then examine the specific attributes and traits of the characters with which middle school students are most likely to identify,” Steinke says.

If scholars can increase the number of women involved in science, engineering, and technology, she believes, the nation will move in the direction of diversifying its workforce and ensuring that women and underrepresented groups play an important role in answering the hard scientific questions that face the current generation. An understanding of how the media influence girls’ perceptions of science and scientists during the formative years of middle school may offer some solutions for educators and parents who want to offer an alternative worldview for adolescent females.

For more information, contact Dr. Jocelyn Steinke at jocelyn.steinke@wmich.edu.
A mural based on the Periodic Table of the Elements is the focal point for the lobby of a new chemistry building opened in 2007 on the WMU campus. Okemos, Mich., artists Amy Baur and Brian Boldon created the signature artwork, titled “Knowledge Made Matter,” using a blend of high-resolution photography and the traditional architectural materials of ceramics and glass. The piece is also a fund-raiser for WMU’s “Elemental Fund,” which helps prevent students from interrupting their studies due to personal or financial difficulties. Donors may select an element to “buy” with a donation in the amount of $500, $1,000, $5,000 or $10,000.