research@rowan:

INNOVATION THAT MAKES A DIFFERENCE

{2015}
Housed at the South Jersey Technology Park, the center expanded dramatically in spring 2015. The center provides participants with an immersive 3D experience without the constraints normally associated with virtual reality. Researchers can bring tables and chairs into the room, and up to 25 participants can easily converse and hold teleconferences. Among many projects, Rowan researchers used the technology to create a rainwater runoff simulation for municipalities plagued by floods, model submarine systems for Naval Sea Systems Command and model a rocket booster trailer for NASA. The system can process ordinary medical scans to produce 3D volumetric visualizations (above), allowing physicians to use virtual scalpels to interactively assess their patients. Rowan researchers also have developed educational applications for schoolchildren (cover).
INNOVATION THAT MAKES A DIFFERENCE

Every day, the professors and students, funders and partners who conduct and support research at Rowan University have the potential to impact lives in their backyard and around the globe.

Whether they focus on cleaner fuels, Alzheimer’s disease, communication strategies or health-care delivery, Rowan teams conduct research that addresses real-world problems, and they develop real-world answers that governments and corporations can quickly implement.

Rowan researchers do not work in a vacuum. They initiate many projects by first determining what partners in government and industry need. Armed with answers, they then match their talents to the identified needs to produce focused, cost-effective research.

This is “innovation that makes a difference.” This is assessing needs and meeting them. This is educating the next generation of engineers and scientists, physicians and psychologists. This is making a difference, here and now and for generations to come.

During the past several years, Rowan greatly expanded its research across campuses in Glassboro, Camden and Stratford, New Jersey, and at the South Jersey Technology Park. In just three years, Rowan faculty successfully raised externally sponsored research from $6 million to $29 million. The University projects reaching $100 million in sponsored research by 2023.

Rowan is ideally positioned to meet that goal. In addition to offering well-respected undergraduate, master’s and doctoral programs, Rowan is one of only two universities in the country with M.D. and D.O. degree-granting medical schools. Professors and students in engineering, the sciences and other academic programs regularly collaborate with physicians and medical students.

While strong academic and research programs and two medical schools are impressive assets, Rowan offers many more.

New Jersey in 2013 designated Rowan as just its second comprehensive public research institution. That has allowed Rowan to enhance its funding and expand its partnerships.

Rowan sits in the middle of the Northeast Corridor, the pulse of the United States. That places the University within easy access of a vast network of Fortune 500 corporations and government agencies, meeting their needs while educating students.

And last year, the Rowan University Foundation itself committed $5 million to a venture fund developed to spur research and entrepreneurship in the Rowan and South Jersey communities.

This is just a glimpse of Research @ Rowan. The following pages share more.

{ Dr. Shreekanth Mandayam }

Vice President for Research
Executive Director of the South Jersey Technology Park
The health-care system had failed him. Jeffrey Brenner, M.D., a clinical faculty member at Cooper Medical School of Rowan University in Camden, would not.

Brenner, winner of a “genius award” from the MacArthur Foundation, stands as the father of a revolutionary approach that holds the potential of providing patients greatly improved care at enormous savings. He began developing his approach more than a decade ago after taking a tactic used by police departments and applying it to medical care for the first time. By analyzing emergency room and hospital admission data, he pinpointed “hot spots” — the areas of Camden where patients with the highest hospital costs lived — and determined that just 1 percent of the patients accounted for 30 percent of the cost. He dubbed these patients “superutilizers.”

As part of a nonprofit organization he founded and directs, the Camden Coalition for Healthcare Providers, Brenner designed a system of intense care coordination for superutilizers, starting with the 560-pound patient. A multi-disciplinary outreach team that includes a nurse, social worker and community health worker coordinates the patients’ care for 90 to 120 days, accompanying the patients to doctor appointments and checking in with them frequently. A health information exchange involving all three Camden emergency rooms, testing labs and many physician practices feeds real-time data to the coalition, allowing analysts not only to keep track of current patients but to identify new patients with high health-care costs.

The intervention also addresses the deep-seated social and mental issues often at the base of physical distress. The teams help patients get addiction treatment, resolve problems with the law and secure safe housing. Health-care managers visit homes to ferret out problems that prevent patients from complying with a doctor’s orders.

Brenner, medical director of the Urban Health Institute at Cooper University Health Care, has seen hospital visits and costs plummet thanks to the program. With new funding, the coalition has begun a randomized research study to quantify the effects of different levels of intervention.

Many communities have decided not to wait for the results. The coalition has helped 25 communities establish similar systems and tracks 25 others using the approach. Brenner believes the country has no choice but to radically change health care. “We have a $2.8-trillion boondoggle called the broken American health-care system that has 85 million baby boomers heading like a freight train straight at it. They will explode the system and bankrupt generations without change.”
Jeffrey Brenner has developed a program to reduce health-care costs by combining data analysis with intense assistance for patients using emergency rooms most frequently. His new study will measure the effects of different levels of intervention.
As the mountains of asphalt build, so do concerns. The state believes Rowan will help provide solutions.

Yusuf Mehta, Ph.D., associate professor in the Department of Civil and Environmental Engineering, and his team at the Construction Materials Laboratory received a state grant to investigate the environmental ramifications of using old asphalt in a variety of novel applications, including walls, guardrails and highway shoulders. In the next several years, the team will employ sophisticated equipment to answer a series of questions: Will chemicals leach from recycled asphalt pavement? Will the asphalt contaminate the water system? Will the recycled pavement emit harmful gases? If Rowan proves no, new uses for old asphalt will stem the avalanche of waste.

Mehta’s team has provided another avenue of hope through a groundbreaking discovery. Many states prevent contractors from adding more than 15 percent of old asphalt to new pavement because of durability issues. Mehta recently proved the mix could go as high as 35 percent with a simple adjustment. The team determined that not all of the binder in old asphalt remains viable, as previously believed. A test developed in the asphalt lab determines how much of the old binder remains useful, allowing asphalt companies to adjust the mix to create pavement strong enough to withstand years of abuse.

The lab has worked with numerous businesses and governmental agencies on the East Coast to meet pressing transportation needs. “What really excites me is this research has immediate practical application,” Mehta says. “It’s extremely rewarding.”
Yusuf Mehta and his team at the Construction Materials Laboratory hope to smooth the way for new uses of old asphalt. Here, Ayman Ali, Ph.D., and graduate students Devin Seibert and Janine Abyad work on alternative testing procedures.
As heartbreaking as the destruction caused in 2012 by Hurricane Sandy was, federal officials fear the most devastating damage to survivors will come in the form of serious health problems months and even years after the rubble disappears. Rowan will provide insight about one of the most vulnerable populations affected by Sandy – the elderly.

The New Jersey Institute for Successful Aging at the Rowan University School of Osteopathic Medicine maintains a resource unique to disaster research: comprehensive information from a panel of 5,688 older people collected before the hurricane struck. Rachel Pruchno, Ph.D., director of research at the institute, spearheads the panel, known as ORANJ BOWL (Ongoing Research on Aging in New Jersey: Bettering Opportunities for Wellness in Life). Her team is recontacting ORANJ BOWL panelists to learn how their health has been affected in the wake of the hurricane. Pruchno hopes findings from the study, funded by the National Institute on Aging, will help officials as they prepare for future disasters.

Information collected prior to Hurricane Sandy covered extensive territory, ranging from demographics and health to spirituality, life satisfaction and leisure activities. The current study includes people unaffected by the hurricane as well as survivors. Outcomes of the study include health and health care use.

The NIA study complements research funded by the U.S. Office of the Assistant Secretary for Preparedness and Response in which Pruchno and her team are examining how neighborhood characteristics relate to resiliency in the face of disaster. “We know that when neighbors help each other, older people do better,” Pruchno says. “But we don’t know if they need just one go-to person or several. This research will answer a critical question: How do we support older adults in the face of disaster?”

The New Jersey Institute for Successful Aging is ranked as one of the country’s top organizations in geriatric medical education, the institute takes a holistic approach to treating older patients, advocating the use of teams that include health-care providers from multiple disciplines. Although the institute records 40,000 patient visits each year, most efforts focus on training health professionals and students in the institute’s approach. “We’re trying to address the critical shortage of providers who have the knowledge and skills to care for the unique needs of older adults,” says Director Anita Chopra, M.D.
Rachel Pruchno will use a rich trove of data and new surveys to determine if Hurricane Sandy affected the health of older New Jerseyans. Here, a woman surveys the damage to her longtime family home after the hurricane.
The lessons *children* impart

March 19th, 1941

Dear Mummy and dadd daddy

how are you getting on

and I want you to come and take me back home back home.

Love from Leila. XXXXXX

Six-year-old Leila was one of 3.5 million British children evacuated to the countryside or colonies to avoid German bombing during World War II. Separated from her parents and far from home, she used the best means available at the time to stay connected – letters. They often followed familiar formulas provided by teachers and government officials that contributed to a public narrative of plucky youngsters doing their part for the war. But like Leila, many young people went off script, abandoning the staple phrases to speak from the heart. Along with letters from thousands of other young people, Leila’s honest writing lends a strong and emotional voice about this era to all who care to listen.

Lee Allen Talley, Ph.D., an English professor and director of the Thomas N. Bantivoglio Honors Concentration, cares very much. Talley has spent hundreds of hours reading letters at the Imperial War Museum in London and tracking down the authors. Her forthcoming book, *Voices from Operation Pied Piper: a New History of the WWII Evacuation of British Children*, examines this chapter of history in-depth through the writings of those most affected – children.

Several themes emerged from Talley’s research, which the National Endowment for the Humanities supported. Children drew countless maps to help their parents “see” the new homes. Books parents and children had read together became important reference points, keeping alive an imaginary Britain far from the reality of war. And, most significantly to Talley, the letters clearly illustrate the resilience of the children and the active role they played in the war effort. “Children are agents, too, but historians tend to look at them differently,” Talley says. “The book drives home how child evacuees add an important perspective to WWII history.”

Thanks to Leila Rothstein Hoffman and the Imperial War Museum for permission to reprint her letter.
Lee Allen Talley has mined the letters of children separated from their parents during World War II for a book about the youngsters’ experiences. Here, children gather in London in 1939 for the government-supported evacuation, which lasted six years.
The answer could point to a solution as simple as a change in diet.

Preterm births represent an enormous problem in health care. They affect 1 in 12 children. Complications are the leading cause of death for children 5 and younger. The health-care costs total $26 billion each year, and the emotional cost to families is immeasurable.

Aside from identifying several risk factors — smoking, drinking, obesity, low weight — researchers remain puzzled about the cause of this scourge. Chen has a powerful resource to help uncover answers: data and blood samples from 2,800 healthy pregnant Camden women gathered by her colleague at the Rowan University School of Osteopathic Medicine, Theresa Scholl, Ph.D.

Chen’s research, the first of its kind, will examine biomarkers that affect inflammation, a cause of a host of health problems. The biomarkers include fatty acids — which previous studies by Chen and Scholl have linked to premature births — as well as other factors. Chen, supported by a grant from the National Institute on Minority Health and Health Disparities, will measure the markers and then divide the data by normal deliveries and preterm deliveries to determine any correlation.

If a correlation exists, a simple blood test will tell women whether they can lessen their chances for a premature delivery. “Modifying dietary fat may be an inexpensive and essential tool in reducing the significant ethnic disparities,” Chen says.
Xinhua Chen hopes to discover why African-Americans and Hispanics suffer disproportionately high rates of preterm births. Here, lab technician Christine Hostetter analyzes blood samples.
Deblinger, co-director of the acclaimed Child Abuse Research, Education and Service Institute at the Rowan University School of Osteopathic Medicine, has spent more than two decades working with Judith Cohen, M.D., and Anthony Mannarino, Ph.D., from Allegheny General Hospital in Pittsburgh. They have developed and refined a treatment program widely recognized as one of the most effective in the world to help children and families heal from trauma. Hundreds of thousands now use Deblinger’s Trauma-Focused Cognitive Behavioral Therapy, including professionals working in the aftermath of Hurricane Katrina, the 2011 tsunami in Japan and the civil war in the Congo.

Several characteristics distinguish the treatment. The program has a beginning, middle and end, most often lasting no more than 20 sessions to allow youngsters to “graduate” to a hopeful future. Therapists deeply involve the parents to address their pain and confusion and to help them serve as powerful role models. And although difficult for youngsters and parents alike, therapists encourage the children to talk about their trauma to shed any vestiges of shame and to develop pride in surviving.

Deblinger and her collaborators initially devised the treatment for children harmed by sexual abuse. They later applied their methods to children who have been exposed to family violence, traumatic losses or natural disasters.

With the support of a grant from the Robert Wood Johnson Foundation, Deblinger has turned her attention to training therapists, testing different methods to find the most effective. She says many therapists shy away from encouraging children to talk about their trauma, a critical step toward healing. “We go into this field to help people feel better,” Deblinger says. “It surprises therapists that encouraging children to talk about distressing experiences can be so helpful in the long run.”
The Child Abuse Research, Education and Service Institute has earned an international reputation for research-supported diagnosis and treatment for children who have experienced abuse. The work of co-founder Martin A. Finkel, D.O., established much of the foundation for the medical diagnosis of child sexual abuse. Co-founder Esther Deblinger, Ph.D., helped develop the first therapy for child sexual abuse to withstand scientific scrutiny. The institute works with child protective services, hospitals and law enforcement officials in seven counties and also offers extensive training programs.
Guiding students

A typical math problem for a middle-school student today might read like this: As a kid, my sister would get to split one soda between two glasses. Then I would pick the glass I wanted.

The student, who sees two glasses behind the text, then answers a series of queries: What is the implied question? What information do you need to find the answer? How might you get that information? How confident are you about the answer? The problem requires analytic thought, team collaboration and the Internet to find formulas.

The problem also requires teaching assessments far different from the weekly exams of days long past. Enter the Rowan College of Education working with the Department of Mathematics under a two-year state grant.

S. Jay Kuder, Ph.D., chair of the Department of Language, Literacy and Special Education, and a team of colleagues have developed a program to train middle- and secondary-school math teachers in formative assessment, an on-the-spot, daily evaluation of their students’ progress and their own effectiveness in teaching the new New Math. The assessments allow teachers to catch students before they become hopelessly lost and to use data collected in the classroom to adjust teaching techniques, if needed.

Rowan coaches visit classrooms weekly to help teachers use different approaches and to collect data. Teachers meet in groups to discuss problems they uncovered and solutions they discovered. An online course gives administrators information about the new techniques.

Kuder’s team made several changes after working with the first group of teachers. To get the teachers to understand the importance of embracing the new approach, the team now shows them samples from the upcoming tests administered under the Common Core State Standards. The team also learned not to assume that the teachers, or even the students, have the technology skills needed to succeed.

Kuder says the assessment and curriculum changes reflect the needs of businesses and industries — not just the new state tests. “This is a different way of thinking. The kids are learning how to solve problems. Businesses need people who can come up with solutions and analyze what is most beneficial.”
Jay Kuder and his team have developed a program to help math teachers continually assess their students’ understanding of complex problems. Here, teacher Carol Jarvis uses an iPad to track her students’ progress at Camden County Technical School in Pennsauken.
Our involvement in Nici’s treatment was absolutely critical to continue doing things at home to benefit him. We saw so much improvement during Rowan’s program. I like to think we were involved in something for the greater good.

– Christine, mother of a 4-year-old boy in Rowan’s autism study

Traditional autism treatment involves a child and a therapist using behavioral techniques that decades of research support as effective. But the current treatment does not always allow room for parental involvement, leaving mothers and fathers yearning for more. A psychologist filled the void a little more than a decade ago with a proprietary program implemented in the home during everyday activities.

Many parents praise the program; many academic psychologists view it warily, noting a lack of empirical evidence to support the process. MaryLouise E. Kerwin, Ph.D., chair of the Department of Psychology, will add an important scientific voice to the controversy and potentially help reshape autism treatment with the Rowan Autism Parent Program, research supported by the New Jersey Governor’s Council for Medical Research and Treatment of Autism.

The groundbreaking study is the first to evaluate the traditional verbal behavior approach in a home setting with parental involvement, the first to examine the new approach independently and the first to compare the two. Kerwin also will compare results from the two groups with results from children not involved in the program but receiving state services.

Kerwin decided to study the traditional treatment in the home to focus the comparison on the different strategies, not the settings. But she also finds that all autistic children and their entire families, regardless of treatment strategy, benefit from involving the people closest to the children in a setting that makes them comfortable.

Early findings lead Kerwin to believe the researchers will discover each approach helps children at different ages and different stages of development. “I don’t think the treatments will be the same for all children; I don’t think this is a one-size-fits-all scenario,” she says. A community that includes more than 1 percent of all youngsters in the United States eagerly awaits the results.
MaryLouise Kerwin hopes to provide vital scientific information to the autism community by conducting the first study to compare two popular treatment programs. Here, therapist Moran Amit Dahan offers encouragement to Nici and his mother, Christine, during a therapeutic play session in their home.

ROWAN’S NOTABLE FOUNDATION SPONSORS  
— Robert Wood Johnson Foundation  
— Geraldine R. Dodge Foundation  
— AT&T Foundation
OPENING UP A CHILD’S WORLD

Rowan University has made a profound difference in the lives and futures of hundreds of South Jersey children with developmental challenges.

Since 2004, Rowan practitioners have worked with children and their families in seven southern counties as part of the New Jersey Early Intervention System under the Department of Health, Division of Family Health Services. Babies and toddlers younger than 3 who lag behind their peers receive help developing cognitive abilities, communication skills, physical dexterity and social and emotional skills. The practitioners include special educators; child development specialists; occupational, physical, and speech and language therapists; behavioral specialists; and psychologists. The participants range from children with sight and hearing challenges to toddlers unable to walk.

The goal? Helping children acquire the skills they need to grow into happy and healthy members of the community.

Twenty-two Rowan practitioners work with approximately 100 children and families at any given time in their natural environments, often the home. The practitioners usually involve a child's family or caretaker and always take the family's beliefs, values and cultures into consideration when developing individualized programs.

Rowan University's program is housed in the College of Humanities and Social Sciences and is partially financed by the New Jersey Department of Health. DeMond Miller, Ph.D., director of the program and director of the Liberal Arts and Sciences Institute for Research and Community Service at Rowan, and Michael Cook, M.A., oversee the program. Miller finds involvement deeply rewarding. “Once a child begins to understand his world, an appreciation for learning takes place,” says Miller, a professor of sociology and anthropology. “When you look at the program in the context of providing a lifetime of opportunity, early intervention is very powerful.”
DeMond Miller oversees therapy programs offered through the New Jersey Early Intervention System to young children lagging behind in developmental skills. Here, therapist Shelly Lucas works with a child in his home.

BREKDOWN OF NJ STATE SPONSORS TOTALING $14.3M IN FY14 AWARDS TO ROWAN:

- **Children and Families**: 19.7%
- **Higher Education Facilities Authority**: 27.3%
- **Transportation**: 5.8%
- **Health & Senior Services**: 17.3%
- **Military and Veteran Affairs**: 2.6%
- **Gloucester County Parks & Recreation**: 0.2%
- **Agriculture**: 0.4%
- **State Council on the Arts**: 0.2%
Anita Chopra, M.D., director, the New Jersey Institute for Successful Aging, $999,000 from the Donald W. Reynolds Foundation to prepare students to care for patients as part of a team that addresses the myriad needs of the elderly.

Tabbetha Dobbins, Ph.D., assistant professor and biophysics coordinator, Department of Physics and Astronomy, $366,000 from the National Science Foundation for a combination Raman and FTIR spectroscope to measure the vibration frequency of molecules.

Jennifer Vernengo, Ph.D., associate professor, Department of Chemical Engineering, $316,000 from the National Institutes of Health for development of a gel that bonds with tissue to form a scaffolding that helps spinal discs heal. The project holds enormous potential for treating lower back pain.

Robi Polikar, Ph.D., chair of the Department of Electrical and Computer Engineering, $300,000 from the National Science Foundation to develop machine-learning approaches to characterize and identify streaming data, whose properties and characteristics change in time. The project holds potential for a wide range of applications, including malware detection, energy-demand prediction and climate data analysis.

Mira Lalovic-Hand, Ph.D., vice president for Information Resources and chief information officer, $3.9 million from the New Jersey Higher Education Facilities Authority for technology improvements.

Kenneth Blank, Ph.D., senior vice president for Health Sciences, and Roberta Harvey, Ph.D., vice president for Academic Affairs, $3 million from the Robert Wood Johnson Foundation for health-care research and education programs.