INSIDE: A Greener Plastic / Building a More Durable Bridge / Mobile Clinic Helps ID those with Hearing Loss

RESEARCH
Research and Economic Development
Spring 2017 VOLUME XX

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The following briefs represent a sampling of The University of Alabama’s research and outreach efforts.

**LEAPing to New Discoveries**

A new, powerful microscope recently installed at The University of Alabama expands exploration in nanotechnology and geological sciences. The newest generation Local Electron Atom Probe, or LEAP, shows researchers the location and distribution of atoms in materials. The instrument, the CAMECA LEAP 5000, provides tremendous versatility that reveals a more detailed atomic map of a material with the ability to probe such materials as fossils and minerals.

“UA is the first academic institution in the Western Hemisphere to acquire a LEAP 5000, and it keeps UA at the leading edge of nanoscience and nanotechnology,” says Dr. Carl A. Pinkert, vice president for research and economic development. “Elevating our research capabilities with a new instrument will open up international collaborations for our faculty and give our students greater opportunities.”

It is housed in UA’s Central Analytical Facility, a lab dedicated to nanoscale characterization — studying and manipulating materials that can be 1,000 times smaller than a human hair.

**Partnering for Mental Health, Substance Abuse Screenings**

The University of Alabama School of Social Work and the Alabama Department of Mental Health have begun the initial stages of an $8 million project that will incorporate mental health and substance use screenings into primary care settings in West Alabama.

The program, known as AL-SBIRT, will span five years and is funded by the Substance Abuse and Mental Health Services Administration, a branch of the U.S. Department of Health and Human Services. SBIRT administrators hope to lessen the number of Alabamians who go untreated and to serve those who are at risk.

The School will also partner with the Tuscaloosa VA Medical Center, Whatley Health Services and the Capstone Rural Health Center to help administer the new integrated services program, which will incorporate alcohol and drug screenings, brief interventions and referral to treatment to address the need for integrated substance use disorder prevention.

**Moving Alabama Forward**

Recently initiated at The University of Alabama, the Alabama Transportation Institute serves as a planning, research and policy resource to advance a 21st century transportation system.

ATI brings together nationally recognized research and development industry professionals seeking solutions to the challenges of building and maintaining a transportation system that provides safety and mobility for Alabama’s citizens, while providing efficient freight movement, stimulating economic growth and conserving energy resources.

This interdisciplinary Institute enables Alabama to lead the way on emerging issues like developing creative solutions for financing the construction and maintenance of roads and bridges, advancing transportation safety research, and evaluating the impact that a quality transportation system will have on Alabama’s economic future.

The Institute will serve as an independent resource that develops unbiased information for use by local, state and national leaders in developing transportation policy. The result will be more informed decision-making that will lead to innovative, data-driven, cost-effective solutions.

**Problems at Work? Parents Might be to Blame**

If you’re having problems at work, there’s a chance that your parents might share some of the blame, claims Dr. Peter Harms, a University of Alabama business researcher.

Harms studied manager-employee relationships in the workplace and found a link between parenting styles and workplace behaviors.

Individuals who had reliable parents view others as potential sources of support. Those individuals who had unreliable parents tend not to see others as sources of support.

Harms and his colleagues speculated that individuals may transfer this pattern of thinking into the workplace and, in particular, that it may influence one’s relationship with one’s boss.

One of the research findings showed that when anxious employees were paired with supportive leaders, they were perfectly fine. But when they were paired with distant, unsupportive leaders, the anxious employees reported higher levels of stress and lower levels of performance. Harms’ research is published in the journal Human Relations.
Measuring Imagination ... and its Benefits

Dr. Ansley Gilpin, the lead researcher at The University of Alabama’s Knowledge in Development Lab, is conducting a study to identify the most reliable and valid measures of imaginative play after receiving a $200,000 grant from the Imagination Institute at the University of Pennsylvania.

Gilpin partners with UA colleague Dr. Jason DeCaro to develop a physiological measure of imagination to add to a broad range of measurements of child imagination.

“We hypothesize that fantastical play exercises cognitive functioning more because it requires inhibiting reality, remembering a complex play script, and shifting attention from reality to fantasy,” Gilpin says.

“We know many children are inherently interested in imaginative play, and we have data to show that children who naturally engage in a lot of fantastical play show cognitive benefits, but we don’t yet know why.”

From Lightning to Lightening

Two University of Alabama professors landed CAREER Awards from The National Science Foundation – boosting their research and helping to promote science.

Dr. Kimberly Genareau received a five-year grant to study volcanic eruptions and lightning. She is observing the chemical changes that occur in volcanic ash when struck by lightning by performing a series of triggered lightning experiments on manufactured ash samples. She’s also developing a curriculum for grade-school students on natural hazards to pique their interest in earth sciences.

Dr. Alexey Volkov received $500,000 to study ceramic-based nanocomposite materials. He is developing a number of computer models that simulate specific ways to enhance these materials, deepening scientific understanding of the process of material fabrication while also showing a way to make the materials stronger and more durable. Ultimately, the research may lead to developing lighter, stronger spacecraft for travel beyond Earth’s orbit.

Breaking Through

A team of University of Alabama physicists received recognition for making key contributions to a landmark study of neutrinos that won the Breakthrough Prize in Fundamental Physics recently in California.

The $3 million prize celebrates a series of experiments involving physicists and labs around the world. They investigated neutrino oscillation and mass. The experiments showed that neutrinos — neutral subatomic particles and fundamental constituents of matter — have mass and that they change character as they travel through space. Before this work, neutrinos were believed to be massless.

The landmark study to which the UA team contributed is called the KamLAND experiment. The Breakthrough Prize selection committee cited KamLAND “for the fundamental discovery and exploration of neutrino oscillations, revealing a new frontier beyond, and possibly far beyond, the standard model of particle physics.”

At UA, the faculty members cited in the prize include Drs. Andreas Piepke and Jerry Busenitz, professors of physics and astronomy.

UA Shares in $3.5 Million Grant to Aid Innovation

The University of Alabama’s role in fostering entrepreneurship and innovation was strengthened via a $3.5 million National Science Foundation grant awarded to the regional hub to which UA and three other universities belong.

The funds, part of the NSF’s Innovation Corps program, known as I-Corps, provide education and research infrastructure to help scientific discoveries reach the marketplace more quickly.

In early 2015 the NSF announced that UA’s Alabama Innovation and Mentoring of Entrepreneurs Center, known as AIME, was selected as home to UA’s NSF I-Corps Site, icorps.ua.edu.

Recently AIME was asked to partner in a hub known as the I-Corps South, headquartered at Georgia Tech and also composed of the University of Alabama at Birmingham and the University of Tennessee.

I-Corps South is one of eight NSF I-Corps Nodes in the nation and will introduce the labs, colleges and universities throughout the Southeast to entrepreneurial education, ultimately increasing commercialization outcomes in each of the participating states.
Customized Foot Care

A University of Alabama student team won a Culverhouse College of Commerce competition in presenting a start-up company’s business plan related to a synthetic skin to aid in health.

SYNSkin, a company with a patented synthetic skin material initially focusing on diabetic pressure ulcer care, won first place in the Edward K. Aldag Jr. Business Plan Competition.

The team included Arnab Chanda, an aerospace engineering major, of Noida, India; Kaitlyn Curry, a chemical and biological engineering major, of Louisville, Kentucky; and Christian Callaway, a mechanical engineering major, of Tybee Island, Georgia.

The company, and other winning teams, received co-working space at The Edge in downtown Tuscaloosa and specialized consulting in business development and for entry into a broader business plan competition.

The company, now known as OneSoles, uses a mobile app and 3D printing technology to make customized insoles to reduce foot pain. Customization can be offered to compensate for sores, blisters or ulcers.

Institute to Address Fresh Water Challenges

The Alabama Water Institute was recently initiated at The University of Alabama as an interdisciplinary research institute that engages in basic and applied research in the area of fresh water.

It leverages existing strengths at the University, addresses future challenges and provides broad-based strategic planning so the state, region and nation meet water needs of the future.

The Alabama Water Institute will collaborate across the entire University as well as with peer institutions and regional centers. It will draw upon researchers from biological sciences, computer science, engineering, geography, geology, law and mathematics to address the need for clean, accessible water in a variety of ways.

Professors and students involved in the Institute seek to establish the University as a leader in collecting and transforming water resource information into actionable knowledge.

TDK, UA Sign Research Agreement

Electronics giant TDK Corp. and The University of Alabama signed a research agreement to address challenges associated with the growing electric-energy movement and the miniaturization of electronic components.

The agreement between TDK and UA’s Center for Materials for Information Technology involves researching long-term solutions to some of the biggest challenges faced by the industry today.

It builds on existing collaborations led by Dr. Takao Suzuki, director of UA’s MINT Center. The effort has two components, rare-earth free permanent magnets and soft magnet metal for high-frequency applications.

The soft magnet material aspect of the collaboration focuses on ways to develop new materials for high frequency devices that further reduces size, weight and cost.

Rare-earth materials make the most powerful and efficient magnets, and their size and reliability are well suited for electric motors that use their magnetic field as power. Price instability makes it difficult to rely on them. Scientists around the world are researching potential substitutes.
For years, manufacturers of some pharmaceuticals or everyday items made of plastic have relied on non-renewable petrochemicals that gush from the bowels of the Earth — black gold, Texas tea — as a key ingredient.

Now Dr. Anthony J. Arduengo III, a University of Alabama chemistry professor, and an international group of scientists are working to replace petrochemicals with a much more chemically complex component that grows, rather than springs, from the ground — wood.

“Wood, a renewable resource that’s easily accessible, offers the opportunity to directly harvest a wide range of building blocks with diverse chemistries and structures that can then be used to build materials for the modern world,” Arduengo says. “Just imagine a modern ‘oil boom’ or ‘gusher age’ that is not based on oil and petrochemicals, but rather the renewable resource of wood.”

Arduengo is a co-founder of an international consortium called STANCE. The consortium, whose website may be found at https://xylochemistry.com/portal/, includes faculty members and students at UA and the Institute for Organic Chemistry at the Johannes Gutenberg University of Mainz, Germany, as well as professors at institutions in Japan, Canada and the United States.

The purpose of the consortium is to spread the word about research involving replacing petrochemicals with renewable biomasses — wood and possibly seeds and leaves — in the making of a host of materials.

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“Petroleum was cheap and easily available, and in the old days it would pop out of the ground in places where you didn’t want it,” Arduengo says. “It didn’t have much value at the time.”

Dr. Anthony Arduengo, UA chemistry professor

“We’ve been extremely active,” Arduengo says. “A big part of this new technology is training scientists and students to take advantage of this technology when it’s in place. These days, the education we receive is based on petro-chemistry, so if we’re going to move into a new technological area and you’re going to rewrite this infrastructure, then you’ll need scientists who are trained a little bit differently.”

And what does this new technology entail? Arduengo’s near-missionary zeal for finding new processes is rooted in his love of chemistry and the environment. For years, manufacturers have found it much easier to use different forms of petrochemicals in their processes simply because they’ve always done it that way.

“Petroleum was cheap and easily available, and in the old days it would pop out of the ground in places where you didn’t want it,” Arduengo says. “It didn’t have much value at the time.”

Arduengo points out that managed forests producing wood for the chemical industry can help to reduce carbon in the atmosphere.

“Those young forests absorb a lot more CO₂ from the air and release more oxygen than an old forest does,” he says. “An old tree that won’t grow much anymore won’t need as much carbon, but a young tree will take a lot more CO₂ from the atmosphere.

So these young forests are a tremendous boom to the cycle of CO₂ in the atmosphere.”

STANCE, the consortium that seeks to spread research about xylochemistry to manufacturers and other scholars, has made several key results public, including a recent cover article in the German publication Angewandte Chemie.

But some of the explorations remain private. STANCE has a two-level website: one for the public and one for the members to exchange information that might be proprietary. Arduengo sees several specific applications for xylochemistry, but they await takers from manufacturers.

“I can point to a couple of things generally,” Arduengo says. “The specifics are there, but we’re waiting on industrial partners to grab on to the pieces of technology. The general areas are plastics – we have some routes to some plastics and plastic replacement materials that we can make directly from wood.

“We have some new dye stuffs that provide pigments for paints. We’re also working on some UV protectants – products that would absorb harmful UV rays and...”

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either protect skin or protect materials in the case of plastics. Another area we’ve been active in is making pharmaceutical pieces – units that can be built into a pharmaceutical molecule.”

The research has excited his colleagues, particularly Dr. Till Opatz, the consortium’s European coordinator and professor at Johannes Gutenberg University of Mainz. Opatz has appeared on German television to discuss the potential of xylochemistry.

“Dr. Arduengo’s work involves, among others, the development of new chemical processes and of new catalysts for running them under eco-friendly conditions,” Opatz says. “Due to his strong links to the industrial sector – he has been a research leader and supervisor at DuPont earlier in his career - Dr. Arduengo has a profound knowledge of industrial chemistry and the requirements associated with bringing products on the market. Plus, it is a sheer pleasure to discuss and to work with him.”

In addition to the work in organic chemistry, STANCE operates an active scholar-and-student exchange. Two German students recently worked with Arduengo at his lab in Shelby Hall, and Arduengo has sent UA students to work in Germany. Opatz and Arduengo also trade continents to further their research. Arduengo sees a strong educational component to all his research.

“I often make the argument to my introductory chemistry classes that one reason why humans are so successful as a species is that we’re inherently chemists,” Arduengo says. “If you go back in the history of humankind and think of those initial discoveries that were important to us, building a shelter – if you think about it, building a shelter requires material science. Is it better to use a material like stone or straw when you’re building a house or some kind of wood structure?

“If you want to keep warm, you need fire. Well, fire is an oxidation process. You need combustibles and oxygen. That process provides both heat and light. Those are the beginnings of chemistry.”

And, along with the educational and ecological prospects for xylochemistry and the STANCE consortium, Arduengo sees a tremendous opportunity to help the economy of Alabama through the switch of some processes from petrochemicals to wood.

“Alabama is a natural place for this technology to develop,” he says. “It’s already a major player in forestry and wood raw materials. If you want to look at something that would be a tremendous boom to Alabama, switching over from petroleum to wood-based materials, we could develop a chemical industry that is sustainable and environmentally friendly with the resources we have in Alabama. It’s a tremendous opportunity.”

Dr. Arduengo is the Saxon Professor of Chemistry within UA’s College of Arts and Sciences.
A teacher refers a student to the principal’s office for disrespectful behavior toward classmates and disrupting instruction. It’s not the student’s first referral.

The student’s behavior is increasingly negative. Discipline options are limited: in-school suspension, detention or out-of-school suspension.

In another classroom at a different school, a teacher uses a unique, proactive system to stem the problem behavior. Instead of issuing out-of-class referrals, the teacher employs positive reinforcement to achieve the desired results: a reduction in problem behavior and an increase in the student’s academic performance.

Too often, schools rely on punishment-based systems that, while effective in short-term situations, do not address deep-rooted issues and sacrifice long-term achievement because students are pulled from the classroom, says Dr. Sara McDaniel, a University of Alabama education professor who directs the Alabama Positive Behavior Support Office.

McDaniel and the Office are working with Birmingham and Huntsville city schools to implement the Positive Behavior Interventions and Supports framework, a model established by the U.S. Department of Education’s Office of Special Education Programs. The effort defines, develops, implements and evaluates a multi-tiered approach to helping schools. The goal is to positively impact emotional, social and academic outcomes for all students.

The PBIS model contains three tiers, the first is a catch-all system to teach and reinforce positive behavior for all students. The second and third tiers include specific interventions for students who exhibit increasingly severe problem behavior.

Keeping K-12 students in the classroom is a primary goal of a behavior modification approach supported by UA educators (Zach Riggins).

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immediate focus of helping address disciplinary rates in 16 targeted schools, which may contribute to low student achievement rates.

Several schools in the district had previously experimented with PBIS frameworks, but no consistency with monitoring was in place, Lyas-Young says.

"Traditionally, PBIS begins the preceding school year, but because we were trying to tackle this with a vengeance, Dr. McDaniel came in with her group to do a training in October (2015), which is unconventional timing," Lyas-Young says.

"Several schools had a high rate of infractions, and we wanted to change the culture of those schools before spring testing 2016. Due to the latency of training, initial challenges were present, but, I will say this, once principals understood the model, when Sarah came in and did the two-day training, once we got through the initial bumps, schools really took it by the horns showing significant improvements in school culture and reductions in incidents like disrespect, fighting and not following the rules. It was a galvanizing moment for those schools."

McDaniel and her team are training a second Birmingham City Schools cohort, a group she’s eager to work with following the initial success. A key component of that success was fidelity at all levels of the district, she says. While it typically takes three to five years to see longer-term effects, if an entire school and district is invested in PBIS, officials can begin seeing immediate changes in attendance and achievement, she says.

"The goal of PBIS is to positively impact the emotional, social and academic outcomes for all students (Matthew Wood)."

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McDaniel and her team of graduate student researchers, the project coordinator, and Dr. Wes Sims, a UA education colleague, are training and coaching faculty and staff in Birmingham and Huntsville to design and manage their own Tier 1 frameworks.

"The goal is to be very clear and open with those students about what we want to see, and be consistent across the building, so students can understand and meet the expectations of adults in the building," McDaniel says. "There are also components of school safety and climate, but, at its core, it’s an evidenced-based framework that is responsive to student needs."

The first requirement for McDaniel and her researchers is buy-in from administrators and teachers. Developing the framework and standards requires consistency on both ends. Training requires a year-long commitment to reinforcing standards and expectations that are customized by the teachers, based on grade, school climate and existing behavioral issues.

McDaniel’s team conducts two days of initial training for teachers and provides a customizable template for school officials. They return once a month to analyze the school’s data and structure their meetings. McDaniel’s team also troubleshoots remotely.

"Initially, many teachers think PBIS is the ‘three Rs’ – be respectful, responsible and resourceful," McDaniel says. "A lot of our focus is undoing that prior knowledge and establishing a brand new framework for each school, which sets individualized expectations. Then we figure out how to teach those, design a reinforcement system, and spend the latter part looking at their behavioral data – office referrals, suspensions, removals, expulsions."

Maria Lyas-Young, PBIS coordinator for Birmingham City Schools, is tasked with supervising district-wide initiatives, tracking behaviors and consequences each quarter.

She says superintendent Dr. Kelley Castlin-Gacutan’s strategic plan includes district-wide implementation of PBIS, with an immediate focus of helping address disciplinary rates in 16 targeted schools, which may contribute to low student achievement rates.

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"It was a galvanizing moment for those schools."

McDaniel and her team are training a second Birmingham City Schools cohort, a group she’s eager to work with following the initial success. A key component of that success was fidelity at all levels of the district, she says. While it typically takes three to five years to see longer-term effects, if an entire school and district is invested in PBIS, officials can begin seeing immediate changes in attendance and achievement, she says.
“If it were easy, everyone would already be doing it,” McDaniel says. “I always compare it to pre-K, where school readiness can prevent problems in the school year. With Pre-K, an up-front investment, educators seek improved trajectories.

“This is the same investment in spending time to develop the framework and analyze the data.”

McDaniel and her team will later train teachers and administrators in both systems to implement Tier 2 of the PBIS frameworks, which is targeted for children with specific behavior problems.

The Association for Positive Behavior Support selected McDaniel for the 2016 E.G. ‘Ted’ Carr Initial Researcher Award for her Tier-2 research. She is conducting a collaborative study with UA psychology professors Drs. John Lochman, Caroline Boxmeyer, and Nicole Powell to incorporate Lochman’s “Coping Power” curriculum into school interventions in Martin Luther King, Jr. Elementary School in Tuscaloosa.

“Early in my teaching career, I saw kids who were being skipped over getting that extra support before they were referred to special education,” McDaniel says. “The consequences of that, for students, are very dangerous.

“Instead of providing extra support, schools were using more suspension. What students are telling us through their disruptive behavior is that they need extra help, instruction and better relationships in their school. It really interested me as a young educator to figure out the most effective and feasible ways to intervene at Tier 2.”

Dr. McDaniel is an associate professor of special education, and Dr. Sims is a clinical assistant professor, both in UA’s College of Education.
A bridge is a bridge is a bridge. Pass under one bridge on the interstate, and you might as well have seen them all. Some are higher or longer, but not different. Right? Wrong.

States have different design standards, different needs, different soil and geography and different materials to draw from to make concrete. A bridge in Alabama is different from one in Colorado or Georgia. And, in Alabama, concrete girder bridges – the run-of-the-mill overpasses that dot the landscape – have a maximum span length between supports of 165 feet. That’s not normally a problem, but for some projects a longer span could come in handy, especially since concrete is cheaper and requires less long-term maintenance than the steel used to make longer bridges.

Longer, more durable concrete girders would mean fewer support structures underneath the bridge, and that could lead to lower construction costs. Besides cost saving, longer spans would mean fewer disturbances over water, wetlands or other natural habitats. In urban areas, such as interstates that sit over city streets, fewer supports would mean less disruption of traffic and business below.

Other states, including Florida, have design standards that allow for longer concrete girders than those in Alabama. But, it’s not as easy as switching to Florida standards.

For one, it would mean the private companies in the state that make concrete girders would have to invest much to change equipment. And, it’s not as simple...
Song worked on the project with his UA colleagues, Drs. Sriram Aaleti and Jim Richardson. Also involved were graduate students David Burkhalter and Vidya Sagar Ronanki.

“We wanted to make sure these cracks don’t happen,” Aaleti says. “We have different designs near the end, and we hoped to find the optimal design.”

The two-year project validated the researchers’ idea on design changes, and the team submitted to ALDOT the design plan for the longest concrete span in Alabama. In the process, the UA team created a wealth of data that can be used by civil engineers across the world to improve girder design and fabrication.

“Other states that have longer concrete girders haven’t necessarily solved the cracking issue,” says Dr. Wei Song, a researcher on the team. “Our method aimed to tackle the issue at the root, from the design standpoint.”

The Alabama Department of Transportation funded research to test the idea at UA, which is home to the one-of-a-kind Large Scale Structures Laboratory that can physically test the models run in computer simulations.

“We are using existing forms and technology to increase the maximum length and the durability of Alabama’s pre-stressed concrete girders.”

Dr. Wei Song, a UA engineering professor
A concrete girder is more than just placed and cured concrete. While concrete is strong in compression, it is weak in tension. Steel tendons are placed inside the concrete forms for the girder and are “pre-tensioned” prior to concrete placement. After the new concrete has cured sufficiently, the tendons are cut loose from their external supports, causing the concrete girder to be “pre-stressed” in compression.

Cracks can develop at the ends of girders where stresses are transferred from the pre-stressing strands to the concrete. Since longer girders typically require more pre-stressing strands, longer pre-stressed girders have a higher risk of cracking at the ends.

The research team designed three different versions of the girder end zone after performing computer simulations. They wanted to see if combining two common methods of mitigating cracks would result in longer girders for Alabama.

One method is debonding, placing plastic sheathing around some of the strands at the girder ends. Another method is decreased harping, or lessening the curve of the strands inside the girder.

They then worked with Hanson Pipe and Precast, an international building products company and one of the largest manufacturers of concrete products in North America, to fabricate the concrete girders at a facility near Birmingham.

The UA team positioned 40 strain gauges inside the girder before the concrete was placed, using data from the sensors to detect crack formation once the concrete hardened and the strands were cut from their support beds, transferring the force from the strand to the concrete.

Four 54-foot long concrete girders were created. One was developed with debonding, another with decreased harping, one with both and one without either. They were each brought to the Large Scale Structures Lab and tested with a load of close to 1 million pounds.

“Testing only the unique capabilities of the Large Scale Structures Lab could provide,” Richardson said.

The result of the testing confirmed debonding and decreased harping means contractors in Alabama could fabricate girders at about 185 feet, 20 feet longer than current methods, without changing or upgrading girder fabrication equipment.

“We are using existing forms and technology to increase the maximum length and the durability of Alabama’s pre-stressed concrete girders,” Song said. “We’re talking about thousands of feet of bridges, so, if we can spend less money maintaining them, we’re talking about saving a lot of money.”

Drs. Song and Aaleti are assistant professors and Dr. Richardson is an associate professor, all in UA’s civil, construction and environmental engineering department.
Zaheri, the opera’s composer, directs performers during a dress rehearsal (Jeff Hanson).

FREEDOM AND FIRE!
A CIVIL WAR STORY

BY JAMON SMITH
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FIVE DAYS BEFORE THE WAR ENDS, UA’S CAMPUS IS OBLITERATED. A TRIO OF SCHOLARS SET OUT TO TELL THE OLD STORY IN A NEW WAY.
The year was 1865, and the American Civil War was five days from ending.
But five days wasn’t soon enough.
On the morning of April 4, Union troops marched on The University of Alabama – a Confederate military school at the time – and obliterated it by fire.
Everything was destroyed except four buildings: Maxwell Hall observatory, a guardhouse, the 1829 Gorgas House and the President’s Mansion.
As Union troops began torching the mansion, Louisa Frances Garland, the wife of then-UA president Landon Garland, stopped them.
She didn’t shoot them, and she didn’t incapacitate them by knocking them upside the head with a candlestick. She just talked with them, and they put the fire out.
When Dr. Paul Houghtaling, director of UA’s Opera Theatre, first heard of Louisa Garland’s exploits concerning the mansion, he was fascinated, and the wheels in his operatic mind began to turn.
“It’s so theatrical to think about a woman, while her husband was off fighting with the Confederate army, saying to the Union soldiers, ‘don’t you burn down this house,’” Houghtaling says. “You’ve burned down the campus and destroyed everything in your path, but don’t burn this house. This is where I raised my family. This is where I raised my children.”
“And, they listened to her. How incredible is it that this woman was able to use the right words to ask them to spare this house? Apparently she asked them to bring the furniture back in the house, and they did so. … It seems so theatrical, like ‘Gone with the Wind.’”
As a 30-year opera veteran, the story of how Louisa Garland saved the mansion became like Luciano Pavarotti performing “Nessun dorma” in Houghtaling’s ears, and he began to set in motion events that would turn that corner of UA’s history into an opera.
“Freedom and Fire! A Civil War Story” had its world premiere Sept. 29 at Bryant-Jordan Hall on the University’s campus. An encore performance was held three days later.
Houghtaling is the opera’s director, Dr. Robin Behn is its librettist – a script writer for an opera – and Dr. Amir Zaheri is the composer.

“I think it’s important for this very old story to be told in a distinctly new way, so that people might become more fully aware of our role in the Civil War.”

Dr. Amir Zaheri, the composer, “Freedom and Fire”
Houghtaling says he waited until 2016 to complete the creation of the opera and premiere it because it’s the 175th anniversary of the building of the president’s mansion.

“I’m thrilled that we are going to have the opportunity to stage our original production and highlight the University,” Behn says shortly before the big day. “I think it’s a chance for people who don’t always go to opera to really enjoy seeing their first opera.”

Behn, a poet and trained musician, had never written a libretto before, but says she saw it as an opportunity to combine her life-long passions for words and music. She began researching the history of the Civil War in Tuscaloosa.

“The research was exciting and ignited my imagination,” she says. “From the facts, I tried to create a sequence of dramatic scenes to tell the story. I wanted to represent a wide variety of characters who were part of this history in this time and place: Mrs. Garland, to be sure, but also the cadets, professors, university president, commanders, enslaved servants and musicians, and other townspeople.”

Behn said the opera moves from one dramatic scene to another. Some of the scenes are contemplative and serious, some are humorous, some are action-packed and others are reflective.

“The opera has many textures in it and has a dramatic sweep that takes it from the beginning to the end,” she says.

Zaheri is not new to operas. This was his fifth operatic composition.

“They have characters, and the music has to move the audience through the story and keep the characters in line, as well as connect the characters to the audience. So, writing it takes a little bit more planning ahead and pre-compositional work before you even write the music – like mapping out the drama and how you understand it – as well as how you want the music to reinforce the drama.”

For this particular opera, Zaheri opted to score the opera for voices and live electronics instead of utilizing live instruments, which is a first for a UA opera program.

“It will all be created with digital music, which I am creating,” he says. “I think it’s important for this very old story to be told in a distinctly new way, so that people might become more fully aware of our role in the Civil War.”

The chamber opera’s climatic end will be Louisa Garland’s confrontation with the Union army, but, before that, the opera will take audiences through a series of scenes such as the Union army marching into Tuscaloosa, a UA librarian saving a single book from a burning campus library and a wedding that the Union troops crash and eat the food.

“It’s sort of a fun thing,” Houghtaling says. “We hear Abraham Lincoln’s voice and words. We hear Gen. John Thomas Croxton, a general in the Union army who is the one who said ‘burn everything.’ So, we’re really working with some profoundly interesting stuff.

“The characters are strong and rich. There’s also some comedy relief.”

Dr. Houghtaling is an associate professor of voice. Dr. Behn is a professor of English, and Dr. Zaheri is the director of contemporary ensemble and assistant professor of composition in the School of Music, all within UA’s College of Arts and Sciences.

“It’s so theatrical to think about a woman, while her husband was off fighting with the Confederate army, saying to the Union soldiers, ‘don’t you burn down this house.’”

Dr. Paul Houghtaling, director, “Freedom and Fire”
A stiff-arm in a football game is a signature move, a classic technique for ball carriers to use their momentum to bulldoze a defensive tackler out of the way.

It’s so revered that it’s enshrined as the pose for the figure atop college football’s most iconic award, the Heisman Trophy.

And, when a star player for The University of Alabama with an injured arm instinctually stiff-armed an opposing player in the 2015 Southeastern Conference Championship Game, he was able to do so thanks to doctors, athletic trainers, engineering students, professors and a 3-D printer.

Kenyan Drake, a running back for the 2015 Crimson Tide, broke an arm in the second half of the season. Fortunately, the break was in the smaller of the two bones in his forearm, so recovery time was shorter. Incredibly, three weeks after the break, he was back on the field. On the first offensive play from scrimmage, Drake caught a pass, put the ball in his healthy arm and stiff-armed, with the other, the approaching defender, gaining more yardage.

The play was the culmination of collaboration between Crimson Tide Athletics and the UA College of Engineering. Protecting the surgically-repaired bone was a carbon-fiber brace, 3-D printed off a 3-D scan of Drake’s arm, work done in a lab across campus from the football training facility.

“When I saw him stiff arm, I winced, but it worked,” says Dr. Ken Fridley, a College of Engineering administrator who helped with the project.
you are dealing with all the distractions that come with being on the sideline, the SidelinER creates that private area where it’s just the athletic trainer, the doctor and the athlete.”

The SidelinER is a model for how I-CAST can work, said Dr. Tim Haskew, director of I-CAST. The project took a relatively simple problem with no existing solution and applied known techniques and knowledge.

“A lot of the issues that high-level sporting fields deal with are things where technology already exists to deal with the issue, but the technology just has not been applied in that way before,” he says.

Similar projects include adapting a golf cart to carry a refrigerated water tank that sprays players practicing in the heat, something the football team began using at practice in 2016.

Students and a professor designed a case for Apple iPads that cools the tablet computer while it is used during a hot practice, stopping the iPad from shutting off from overheating. Even the brace for Drake, now with the Miami Dolphins, applied an existing technology for a specific athletic need.

“We could have fabricated some type of cast or heavy padding, but, at his position, Drake’s brace is on a growing list of projects between athletics and academics at UA, joining top-shelf athletes with leading-edge researchers in mutually beneficial situations.

To make the relationship formal, UA System trustees established the Integrative Center for Athletic and Sport Technology, or I-CAST, a research center devoted to the development of new technologies and the application of existing technologies for the purposes of reducing injury, accelerating recovery from injury, enhancing human performance and optimizing nutrition in performance and recovery.

“I-CAST opens the door for a lot of possibilities and great collaboration between athletics and academics that would be unparalleled on any college campus across the country,” says Jeff Allen, assistant athletic director for sports medicine. “This will benefit our student athletes, helping them have success and keeping them healthy.”

The center draws on expertise from the fields of engineering, exercise science, health science, athletic training, nutrition and kinesiology, giving researchers access to top-notch athletes in UA’s varsity programs as well as the University’s internationally-known Adapted Athletics.

“Interdisciplinary is a big buzz word in academics, but few people do it in a way that connects people from across the same campus,” says Dr. Elizabeth Hibberd, I-CAST associate director. “It’s unique that all these sides of campus are coming together to improve patient care.”

The beginnings of I-CAST came in the summer of 2015, when Allen approached his friend, Dr. Charles L. Karr, dean of the UA College of Engineering. Allen wanted a tent that could be easy to transport and quick to set up on the sideline so doctors and trainers could evaluate injuries in privacy, instead of in view of fans, opposing teams and TV cameras.

Karr handed the project to four seniors in mechanical engineering who designed the collapsible tent that can be carried by one person and set up or taken down within a few seconds — all without blocking the field from the view of fans and reporters. The students drew on mechanical design and material science, and it was used throughout the 2015 season, garnering national attention within the athletic training community and in the media.

The patent-pending tent was so successful two of the students and Allen spun off a company to market and sell the tent, now called the SidelinER. In 2016, more than 50 football teams and an NFL team used the tent.

“When I saw him stiff arm, I winced, but it worked.”

Dr. Ken Fridley, a College of Engineering administrator, on watching former Crimson Tide running back Kenyan Drake compete while wearing a brace 3-D printed in a UA engineering laboratory
“These are high-level, extremely-talented athletes that are being somewhat limited by their equipment, and, for us, that’s something that needs to be addressed.”

Dr. Timothy Haskew, a UA engineering professor, discussing a new center’s work with adapted athletes

Professor is also working with UA Adapted Athletics to improve designs used by athletes in wheelchairs. In the rough-and-tumble sport of wheelchair basketball, for example, athletes need to be secured to the chairs while retaining free movement of their upper bodies. Often straps are adapted from snowboarding or use ratchets from cycling that quickly wear out.

“They are not being used for what they are designed for, so they don’t work as well,” Haskew says.

Engineering students worked with athletes to devise inserts made of 3-D printed nylon and Kevlar that slip onto the straps to prevent material fatigue.

Another issue was the grips used by athletes who race in wheelchairs. Existing grips, typically made of self-molding plastics, easily wear out. Students worked with a former UA student who participates in marathons to develop a 3-D printed grip that should be more durable.

Other projects with UA Adapted Athletics continue as the director of the program, Dr. Brent Hardin, is an I-CAST participant.

“These are high-level, extremely-talented athletes that are being somewhat limited by their equipment, and, for us, that’s something that needs to be addressed,” Haskew said.

Haskew hopes the more practical, immediate projects end up producing the relationships and intellectual property that, in turn, can help further more advanced academic research.

One such project is ongoing between UA Athletics and kinesiology. Dr. Michael Esco, an exercise scientist, and Andrew Flatt, a doctoral candidate, say expanding the clinical physiological measure of heart-rate variability into sports science may improve athletic performance and reduce injuries.

Esco and Flatt, among other exercise science students, are working with the UA football team to provide data to team trainers.

Heart rate variability, or HRV, measures the variations between consecutive heartbeats. It is an internal indicator of how well a body is ready to perform on a given day. Measuring HRV regularly can provide trainers data on an athlete’s levels of rest and recovery.

The metric has traditionally been used more for clinical purposes, but Esco, Flatt and their team use it more as a measurement of recovery and readiness to perform. They capture HRV data in UA athletes on a daily basis via electrocardiogram and smartphone/tablet applications.

“Even though athletes lift on the same type of program, they’ll all react differently,” Esco says. “We can look at how well someone is adapted to a particular stimulus, which depends on athletic status. For some people, heavy workouts may cause HRV to drop, while others may experience no change in HRV. So, we’re getting to the point where HRV may be used to undulate a training program and individualize a workout stimulus based on that information.”

In previous studies with swim, soccer, and endurance athletes, the researcher found athletes whose HRV readings had tighter fluctuation day-to-day performed better in their events and had a better state of recovery.

Esco and Flatt hope to expand HRV research to reflect physiological readiness in military members and others. The broader implications of I-CAST projects should reach beyond sports to industrial workforce, healthcare, physical therapy and military fields.

“A lot of people are required to have agility, stamina and other athletic traits at their jobs,” says Dr. Jonathan Wingo, I-CAST associate director. “We should be able to take something we do and apply it to situations we had not even thought of when we started out. That’s exciting.”
Before the 2016 Olympics in Rio, Simone Biles was not a household name. With the spotlight on her, she impressed the world with her outstanding gymnastics moves and her four gold medals. Many Olympic athletes became overnight sensations for their feats in the water or on the mats, tracks and fields.

So, what comes after Rio? How do they turn their success into a marketable image? They need a personal brand. And, three University of Alabama media professors are helping.

To teach Olympic athletes how to manage their public image, the International Olympic Committee teamed with Athletic Learning Gateway in London to create an online class to teach current and former athletes how to build their personal brands. The English company creates online academic lecture videos featuring professionals from around the world to help current and former Olympic athletes navigate their new world.

In February, they contacted Dr. Andrew Billings, one of the aforementioned media professors, and requested his involvement.

THE OLYMPIC SPOTLIGHT SHINES BRIGHTLY ... IN GOOD AND BAD TIMES. A TRIO OF MEDIA EXPERTS WAS ASKED TO HELP OLYMPIANS AND OTHER ATHLETES MANAGE THEIR BRANDS.

BY RICHARD LECOMTE AND JAMON SMITH
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Athletes who claim Olympic gold can sometimes translate their success into marketable images. UA communicators can help (Jeff Hanson).
“The Athlete Learning Gateway asked me if I was willing to do these online learning modules and said they wanted more diverse presenters,” Billings says. “They asked me did I know anyone, and immediately I thought of my fellow UA sports media professors in CIS – Dr. Kim Bissell, and Dr. Kenon Brown.

“We came up with a design where each of us would do a solo presentation, and I wrote the introduction. We shot it here at the UA Digital Media Center in May. The Athlete Learning Gateway edited it and created quizzes for the course, which launched in July.”

The free online class, “Sports Media – How to Build Your Athlete Brand,” teaches athletes about media perception, media engagement, image building and, if necessary, image repair.

Billings focuses on the online branding aspect of the class; Bissell teaches how to interact with the media in the traditional form through interviews with reporters; and Brown concentrates on image restoration – how to handle a crisis when things go awry.

“The class is all about athletes’ brands — who you are, who you want to be and who the public thinks you are and wants you to be,” Billings says. “A famous Boston University study found that 92 percent of what you think of a person is determined in the first 30 seconds. Fifty-five percent is determined before you say a word — how you’re dressed, how comfortable you feel in your own skin, how credible you seem. Another 37 percent is determined in those initial words — your volume, pitch, confidence, vocabulary.”

In his module, Billings stresses building and managing an athlete’s brand online. He drives home such basics as managing your image online and grabbing your domain name while it’s still available, even before you head to the Games.

“There are two parts to your brand identity — the you that existed online before you became an Olympian and then afterward,” Billings said. “Before, what you might have posted that may be taken the wrong way by media or taken out of context — or that you wish you had never said to begin with. I also give advice on securing domain names — is it OK to have other people posting and Tweeting things for you? Is that an optimal or less than optimal idea?”

Billings also encourages athletes to let their true selves shine through in social media —
authenticity is the key. If an athlete is comfortable with lots of images, posts and attention, then fine. If not, then stay off some media. But, if an athlete does engage in social media, be sure to be social – score points by interacting with fans.

“If you don’t post pictures of your life, don’t start an Instagram account,” he says. “The last thing people want is another inactive Instagram account to follow. Not having one is better than having some fake, meager platform. If all you do is Facebook then all you do is Facebook, and that’s OK. Re-tweeting a picture you took with a fan could mean the world with these people. There’s some sort of interactivity and connection that you’ve made with social media.”

Bissell focuses on briefing athletes about traditional media. Unlike social media, which allows athletes to address fans directly, traditional media – newspapers, television or radio – involve a journalist asking questions and shaping the message. Sometimes it’s not enough for athletes to win to draw media coverage: Traditional media require a compelling story, or “hook,” often about an unusual family situation or an obstacle to overcome.

“There was a runner named Kate Grace who won the Olympic Trials and qualified for the 800 meter finals in Rio,” Bissell says. “She’s a Yale grad and was a great collegiate runner. Despite her success in the last year on the track, what the media focused on was her mother, who was known for a series of aerobics videos in the late 1980s. Many of the stories lead with her famous mother rather than the PRs she was setting on the track.”

The media used Kate Grace’s mother as the angle for a story on Kate as a runner. Still, when traditional journalists post their stories, they become part of the social media scene as much as Facebook messages or Twitter posts, and they can be valuable to augmenting an athlete’s brand, Bissell says. Traditional media also can offer an athlete unjustly maligned in social media a chance to tell her story to a sympathetic reporter or television host.

“At times, probably don’t have much experience with the traditional or legacy media,” Bissell says. “The stories are probably already out there on social media, but the traditional media outlets still put out stories about events and can provide a lot more detail than what you get in 120 characters.”

Brown researches public-relations strategies for athletes who get in trouble. In his talk, he stresses how athletes need to show genuine feeling and remorse in responding to whatever happened – even if they can’t take total responsibility for issues of liability.

“Truth, transparency and honesty are really important,” he says. “If you aren’t forthcoming with the truth, somebody else will be forthcoming with the truth. So, you need to get your version of the story out and get it out quickly. If you don’t get your side out as quickly as possible, two or three other versions of the story are going to be out. So, both accuracy and timeliness are keys. Sometimes an athlete, like U.S. gymnast Gabby Douglas, can inadvertently set off a controversy in the Twitterverse – when she didn’t put her hand over her heart during the National Anthem. A few bloggers were irate, and their tweets found their way into traditional media. Brown says a statement of regret – acknowledging some people may be offended while not saying the action was wrong in the first place – is the best way to go.

“Apologies are very powerful as well, and there’s a way to apologize without accepting blame,” he said. “Gabby Douglas didn’t have anything to apologize for, but she did express regret. She apologized to anybody she offended, he says. She didn’t necessarily say this is my fault. She didn’t take the blame. She said, if I offended you with my actions, I apologize. I think that’s the right course of action there.”

The class provided these mass communications professors an opportunity to bring their research into a practical arena, where their work might help an Olympic athlete navigate the 24/7 world of media. And the class isn’t just for athletes – anyone can sign up to view it online, and Brown says some college classes will be using them for instruction.

“I was really able to incorporate my research in a more applied way,” Brown says. “I took my findings from my research and thought about what does this mean to athletes who are trying to repair their images. It’s very easy for me to translate that – and a lot of fun, because you get to present the research in a way that really matters to them.”

Truth, transparency and honesty are really important.
If you aren’t forthcoming with the truth, somebody else will be forthcoming with the truth.

Dr. Kenon Brown, UA assistant professor of advertising and public relations
When Dr. Marcia Hay-McCutcheon moved to Alabama to work with people who have cochlear implants – an implantable hearing aid – she had, at the most, 15 people in her studies.

Fifteen people doesn’t make a research project.

“So, I started to think, ‘why am I not getting larger groups of people?’” says Hay-McCutcheon, an Ontario native and auditory expert at The University of Alabama. “Just looking around at what was available in this area for hearing health services made me realize that there could be a lot of people who haven’t been identified.

“If they’re not being identified then, obviously, they’re not being helped.”

The reason many people weren’t quickly helped became obvious: they lived below the poverty line and lacked transportation to get to a hearing exam, even if the exam was free. A rural, neighboring county illustrates the point.

“Greene County’s poverty level is 32 percent. There’s no way lots of people there can get to an urban area and have their hearing checked.”

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This swift realization changed the way Hay-McCutcheon, who started her career as a primary school teacher before later working specifically with deaf and hard of hearing children, approached her data gathering.

Instead of having the people come to her, she had to go to them, but the audiology equipment she needed to conduct a proper hearing screening wasn’t exactly portable.

So, she approached Dr. Robert Olin, dean of UA’s College of Arts and Sciences, with an idea: a mobile hearing center.

“He talked with other administrators on campus at the time, and this truck came about because of the generosity of those individuals,” she says.

The mobile hearing center is a large recreational vehicle, or RV, that’s been turned into a fully equipped mobile audiology clinic.

The truck can be used for diagnosing, evaluating and assessing hearing loss and issues that go along with it.

“We have two sound booths. Each sound booth has all of the state-of-the-art equipment to test hearing. I don’t know of any other university program that has this wonderful, fabulous, mobile audiology clinic.”

Since December 2015, about 400 people – 150 in the counties and the rest at health fairs – have been screened.

The truck goes out year-round, about two or three times a month. It generally sets up in widely used public spaces.

“We see some people who come just to get their hearing tested, but the majority we see do have hearing loss, and they all want help,” she says. “That’s why I’m trying to get funding for hearing aids to help these individuals.”

Hay-McCutcheon, who holds a doctorate in hearing science, says hearing loss impacts every part of a person’s life in terms of communication. If a person can’t hear well, they cannot communicate well, and they start to withdraw, which causes their quality of life to deteriorate.

Screenings can determine the level of a person’s hearing loss through the truck’s sound booths and testing equipment.

Once a person sits inside the glass booth, they don headphones and are instructed to press a button when they hear a sound. Sounds of varying volumes are issued from the headphones in both ears or in either ear to discover the softest sound, or threshold, a person can hear.

“I don’t know of any other university program that has this wonderful, fabulous, mobile audiology clinic.”

Dr. Marcia Hay-McCutcheon, UA auditory expert

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“There are degradations of hearing loss,” she says. “When we test your hearing, we’re using decibels. So, how many decibels, or how loud does the sound have to be in order for you to hear it?”

Responding to sounds between 0-25 decibels in both ears – across different tones – indicates normal hearing. If a person hears sounds between 26-40 decibels, that’s a mild hearing loss. Other ranges indicate moderate, moderately severe or severe loss. Everything above 90 is profound loss, which is considered deaf.

According to Hay-McCutcheon’s preliminary data – they have a year’s worth – there seems to be a higher prevalence of hearing loss in rural areas compared to urban areas.

“The other thing that we found is that physical health is highly associated with hearing loss,” she says. “So people who have other physical health conditions are also more prone to hearing loss.

“One of the things that we did find is that cardiovascular issues and type 2 diabetes are conditions that a lot of people in rural counties have, and they’re also associated with hearing loss. So, if there is a higher prevalence of diabetes and other cardiovascular diseases in rural areas, there is also a higher prevalence of hearing loss. That’s what the next phase of the project is going to look at.”

Dr. Hay-McCutcheon is an associate professor in UA’s department of communicative disorders. UA’s College of Arts and Sciences, the Office of the Vice President for Research and Economic Development and its Research Grants Committee all provide funding for the project. 
The Enron debacle in 2001 is one of the biggest financial audit failures in U.S. history. Enron and its hired accounting firm defrauded shareholders, which led to its bankruptcy and demise. Employees and shareholders lost billions in stocks and pensions. Thousands of workers lost their jobs. The Sarbanes-Oxley Act was enacted the following year to increase the accountability of auditing firms and force auditors to remain independent of their clients.

A similar corporate accounting scandal occurred in Alabama in 2005 when HealthSouth’s founder and former CEO Richard Scrushy was tried under the Sarbanes-Oxley Act for allegedly altering HealthSouth’s financial returns. Jobs, stock value, pensions, a company’s survival—are all in jeopardy when the books don’t balance. And nobody knows this better than one of the nation’s most prolific accounting researchers, The University of Alabama’s Dr. Rick Hatfield.

‘E’ STANDS FOR ERROR

OVERRELIANCE ON ELECTRONIC COMMUNICATION LEADS TO INACCURATE FINANCIAL STATEMENTS, RESEARCH SHOWS

BY EDITH PARTEN

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He recently conducted research that provides insight into some of the reasons behind auditing errors. His work delves into how modes of communication with clients (face-to-face or computer mediated) and generational differences impact the accuracy of audits. Multiple audit firms have incorporated his research into their firm training as well as their audit methodology “best practices.”

Hatfield examined how the interaction between staff-level auditors and those in client management affect the auditors’ perceptions and influence decisions regarding the collection of audit evidence. When conducting field audits, staff-level auditors, who are usually younger, have extensive interaction with client management, who are typically older and more experienced.

Survey evidence collected suggests that the staff-level auditors are often “mismatched” with client management. As a result, the younger auditors might reduce the extent to which they collect information for the audit in order to avoid interactions with client management.

“The mismatch of a new generation of auditors with older, more experienced auditors has led to errors in financial statements,” Hatfield says.

Hatfield’s research further shows that when staff-level auditors use e-mail communication with client management, it helps to mitigate the lack of information collected caused by the avoidance of in-person interactions.

However, in cases when the young staff auditors did not collect all of the evidence needed, about half of the participants in the research survey documented their findings in a vague or inappropriate manner.

“This would likely reduce the likelihood that reviewing auditors would find a problem,” says Hatfield. “Given the extent of evidence collected by young staff auditors, these findings have direct implications for audit process documentation and audit quality.”

The research also reveals the qualitative differences that occur when client meetings are conducted electronically versus face-to-face communication. It shows that older, more experienced auditors prefer face-to-face communication, which allows for gathering more content and follow-up questions. But there’s a downside.

“...errors in financial statements.”

Dr. Rick Hatfield, UA accounting researcher
Hatfield’s research delves into how modes of communication with clients and generational differences impact the accuracy of audits.

“We found that the non-verbal cues in face-to-face meetings associated with deception—less eye contact, delayed responses, more ‘uhs,’ and raised voices—leads to increased professional skepticism,” says Hatfield.

The evidence suggests that younger auditors prefer electronic communication over face-to-face.

“Auditors who communicate electronically request more documentation, but they ask fewer critical questions,” says Hatfield. “While trying to avoid interactions with clients, the younger staff-level auditors are reducing the extent to which they collect audit evidence due to the social avoidance factor.”

The study also finds that younger auditors are generally more accepting of evidence collected electronically than their older reviewing partners who sign off on the audits.

Hatfield’s research provides experimental and survey evidence that younger auditors are less inclined to meet face-to-face with the companies they audit, feeling intimidated by the confrontations and interruptions necessary to gather appropriate audit evidence.

The study also reveals that younger auditors tend to resort to electronic communication to ask questions necessary to resolve problems that surface during the audit.

“Using this channel of communication, the younger auditors typically ask fewer questions and engage in far less relationship building behavior,” explains Hatfield.

The result, according to the study, is that financial statements are more likely to contain errors, or purposeful exaggerations, which reduce the quality of this information, potentially causing harm to the investing public and employees of the company.

Hatfield is working on innovations to overcome the tendency to rely on computer-mediated communication by younger auditors and to improve audit quality in an audit environment where communication by computer is only likely to increase.

He’s also studying to see if the younger generation is better at uncovering deception in computer-mediated communication.

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Dr. Hatfield is the Fayard Endowed Chair in UA’s Culverhouse College of Commerce.
Dr. Randy Salekin makes his way through a bare hallway, his briefcase, laptop computer and EEG neuro cap in tow. He’s about to interact with a group of people who have a variety of behavioral issues: substance abuse, conduct disorder, criminal mischief and gang activity, among others. They’re in a state-managed correctional facility. Some will be there as few as three months. Others will have a two-year stay.
Salekin sits, boots up his computer and begins demonstrating the different parts of the brain that are related to impulsive and unsympathetic behaviors.
Soon, the participants begin asking “why?”
They’re children, naturally inquisitive and often blunt. But for the boys at the Alabama Department of Youth Services Vacca Campus in Birmingham, they’re intrigued by the science behind their own behaviors.
“The kids realize they have, essentially, hardware and software that you’re trying to change, and they’re part of that process,” says Salekin, a professor of psychology at The University of Alabama. “It takes a lot off them, as far as the blame and responsibility that they’d traditionally have.”
Salekin and his team of graduate research assistants have developed a system that combines science education, technology, and positive psychology as well as positive reinforcement that he says has been more effective at reaching troubled youth at the facility than typical methods, like empathy training or strict discipline.
The UA-led team has conducted the interventions at DYS with boys ranging from ages 12 to 18 since 2012.
Their first approach is to pique the children’s interest in learning about their brains and brain functioning. This lessens the initial focus on what they’re doing wrong and why they shouldn’t repeat the behaviors. Instead, the emphasis is on scientifically explaining the mechanics of the brain that led to them acting impulsively and, perhaps, uncaringly toward others.
Salekin uses his laptop computer and LCD player to explain brain plasticity and how the youth can help regulate emotions, and show greater empathy toward others, while their brains continue developing.
The children are then tasked to develop a five-component plan aimed at improving relationships with friends and loved ones. Other plans target education, careers and athletics, but the common thread is “improvement.”

“We have kids who have mental health and behavioral issues, and, in the past, they’ve relied on medications, but most of it has to do with their willingness to change.”

Melanie Hunter, a Department of Youth Services case manager

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"It allows them to think about how they’re in control of some of the things they do, and ‘what would happen if I use these skills,’” says Melanie Hunter, DYS case manager. “It’s about getting them to understand they have the power to do it.

“I’m just a vehicle. We have kids who have mental health and behavioral issues, and, in the past, they’ve relied on medications, but most of it has to do with their willingness to change.”

Salekin said previous studies of positive interventions have mostly been applied to participants who are adults, college students or depressed patients. None, at least at the point when he began working with DYS, used the approach with both large- and small-group interventions for children having callous-unemotional traits or conduct disorder.

Further, any previous positive interventions with children focused on wellbeing rather than correcting behavior.

The novel approach has yielded positive data on multiple fronts, Salekin says.

“Improvements have been made in the behavior of youth on the units,” Salekin says. Also, behavioral measures (via self-reports), which include gauging developmental maturity, amenability to treatment, risk, and arrogant, callous, and daring impulsive traits, improved.

“We are seeing some improvement in behavior and declines in traits such as daringness that are more harmful to the young individuals. These are very positive markers for us.”

While Salekin and his team identified positive results, they’re analyzing the progress by groups. Individual markers are more difficult to identify, particularly when the children leave the facility.

Recidivism rates are difficult to collect — especially when youth move. The data for behavior with friends and loved ones and the children’s motivation to set goals and work toward them can’t be tracked once they leave.

The researchers say they get a sense of the direction in which the child is heading based off their participation levels during interventions.

“The kids who are buying in are the ones who have a lot to contribute during our group session,” says Abby Clark, one of Salekin’s graduate research assistants. “You can tell that they’re really thinking, processing it and applying it.”

“For me, it’s been case by case. At some point, there are kids we know we are helping, but we’re sending them back home to sometimes chaotic situations. That is tough. I’ve had moments of leaving work, thinking about it, and being a bit discouraged. You hope that you’re planting seeds for change in the future.”

There’s physiological data, too. It’s rooted to the tasks the researchers assign the students — like creating and actively pursuing goals. This, the researchers say, affects brain development so it can be regulated. The idea is to stimulate different parts of the brain during a child’s natural development and to measure the growth using an electroencephalogram (EEG), which assesses electrical activity in the brain.

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“With kids who have particular disorders, we’ve found they have a longer latency to new stimuli,” Salekin says. “After treatment, the latency appears to be shorter and the general amplitude is lower, suggesting that there may be a quicker response to stimuli and greater spread in the brain activation once the youth go through treatment.

“So, instead of having everything focused in one area when a new stimuli comes up, and to be slow in the process of noticing this new information, it looks like they might be quicker to detect novel stimuli and appear to be using more of their brain to see this new stimuli.

“It’s our first finding that we presented at the American Psychology and Law Society in Atlanta in the spring.”

Salekin and his team will continue collecting and analyzing the EEG data, but it’s the base of the positive intervention that he hopes influences future treatment models, particularly with children.

“I think the research on this intervention is critically important because there are not many empirically-based group interventions for use in detention centers and other captive environments,” said Adam Coffey, a graduate research assistant. “And for facilities that may be short on resources, this intervention is pretty simple to implement. One can follow the manual and deliver the content in an engaging and excited way – you can do that for free. We’re hoping that through the research, we can disseminate it and accumulate a good evidence base for its effectiveness.”

Dr. Salekin is a researcher in UA’s College of Arts and Sciences.