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Cover Article on Pages 7-8
Decipher is produced by Clemson’s undergraduate students to describe the accomplishments of their peers in Creative Inquiry – Clemson’s unique brand of undergraduate research. Each year, more than 3,500 Creative Inquiry students investigate topics ranging from children’s literacy to medical microbiology to developing the next generation of solar cells. Creative Inquiry provides students with an outlet for their curiosity and allows them to take a closer look at the problems facing our University, our community and beyond.

*Decipher* features some of the more than 500 Creative Inquiry teams. Each year, a new group of students tackles the task of creating the next *Decipher*. Undergraduates interview Creative Inquiry faculty and students, write the articles and produce illustrations. A student Editor coordinates completion of the articles. The student Creative Director develops the graphic design. Faculty and staff members advise and guide, but *Decipher* is a student product.
in this issue...

7. Creating a Lasting Impression
9. Re-Inventing the Wheel
11. Writing Fellows
13. Carbon Dioxide Flux
15. Fungus as a Fuel
17. Building Haiti on Bamboo
19. Standing Tall
21. Reviving a Tradition
23. Mailed Just For You
25. Gangsters in America
27. The Sound Synthesizers
29. Greek Students Generating Change
31. Pedaling Towards a Healthier Lifestyle
33. Literature as a Lens
35. Food for Thought
37. The Simple Genetics of Dog Breeding
39. Taking the Plunge
Can You See the Rain 41.
Gaming Around with Science 43.
An End to the Great Food Fight 45.
Printing in the Third Dimension 47.
Changing the Flow of Energy 49.
Simplifying Architecture Hands-On 51.
Pulp Cells for Dental Tissue Regeneration 53.
Getting a Clearer Medical Picture 55.
Motivating Young Readers 57.
Creative Inquiry in the News 59.
Some of the most impressive people I met in my “first semester” at Clemson are the students who work on our Creative Inquiry teams. I have introduced them to and bragged about them to groups large and small.

Creative Inquiry (CI) is Clemson’s distinctive undergraduate research program – one that brings together teams of students to tackle real-world questions and problems.

By doing that, our students learn important skills like teamwork, problem solving and communication. These lessons will benefit them in their work and life beyond Clemson.

What have they accomplished?

Clemson Creative Inquiry students established a national student organization dedicated to saving wild tigers and tiger habitat.

They made more than 200 presentations and published 70 articles in professional journals.

Over the past five years, we have seen Clemson Engineers for Developing Countries (CEDC) evolve from a single engineering project (to develop a clean drinking water system for a village in Haiti) into a multi-pronged effort with 80 students representing 30 majors running 18 different projects at home and abroad.

These students and faculty are doing such great work that CEDC won the prestigious Andrew Heiskell Award from the Institute for International Education in 2014. This is one of the Top awards in the world for international education.

I am very proud of these students, and all of the students whose work is reflected in the pages of this student-produced issue of Decipher magazine.

Go Tigers!

Jim Clements, President
Creative Inquiry completes another exciting and productive year. This third volume of Decipher features a small sampling of our students’ remarkable accomplishments.

Students are the most important part of Creative Inquiry – all that we do is designed to empower them in their studies and future careers. Thus, we frequently ask our students how their Creative Inquiry experiences affect them, and the feedback we get is fantastic.

Year after year, we see several consistent themes emerge. Students tell us that Creative Inquiry exposes them to real world experiences not available in the classroom, provides hands-on research experiences, prepares them for work in their specific fields, and provides opportunities for them to work closely – and build relationships – with faculty mentors.

We also ask graduates to reflect on their Creative Inquiry experiences. Alumni tell us that their involvement in a Creative Inquiry project not only impressed potential employers, but also provided knowledge and skills directly applicable to their new jobs. Alumni going on to post-baccalaureate studies expressed similar benefits – their Creative Inquiry experiences helped them gain acceptance to graduate schools.

In addition to gaining expertise in their disciplines, Creative Inquiry alumni praised the benefits of working on a team to reach project goals often – attributing improvements in their communication and leadership skills to the team experience.

Overall, Creative Inquiry has become an invaluable feature and highlight of the Clemson undergraduate learning experience.

Barbara Speziale, Associate Dean
Creating a Lasting Impression

Walking around campus, it is not hard to find public art that has been implemented into a number of sites throughout the years.

In Fall 2012, Art department faculty members Joey Manson, David Detrich and Denise Woodward-Detrich began Atelier InSite, a Creative Inquiry project that implements public artwork on the Clemson’s campus. It capitalizes on a cross-disciplinary and inclusive approach that is predominantly student driven. The goal is to create a new paradigm for the administration of public art on university campuses.

Manson believes Atelier InSite is helping to gain more student involvement and initiate awareness about not only what kind of art should be implemented on campus, but also why.

“There’s some public art on campus already, but it wasn’t as inclusive with student outreach,” Manson said. “This mechanism is much different. It’s a different model. We study the various ways public art works in universities across the country—how art works, how it functions and how it also fails.”

So how can art fail?

“Well public art’s role is to raise questions and prompt discussion,” Manson said. “We’re not about adorning a building; we’re about creating dialogue that can happen here on campus.”

To ensure no art sits in silence and potentially falls unnoticed, Atelier InSite’s team of 14 Creative Inquiry students, in ten different majors, spent hours perusing 218 portfolio submissions from around the world and narrowed them down to three finalists they felt best represented the Life Sciences Facility and surrounding areas. Proposals were requested from these finalists, and ultimately the commission was awarded with input from faculty, staff, and students working in the facility.

Atelier InSite’s latest project was installed in the atrium of the new Life Sciences Facility—a piece by San Francisco artist Klari Reis, whose 600 individual paintings are embedded in petri dishes of varying sizes.

The students are currently working on implementing art into the Watt Family Innovation Center as well as into the Lee III Expansion.

“Public artwork is something that evokes thought and isn’t always aesthetically proven but the main purpose is to make the viewer wonder.”

Sophomore visual arts major Rebekah Warren believes that her contribution to the project has taught her a lot about the art on campus and people’s various perceptions of it.

“It gives me pride that we’re able to decide these things,” she said. “Public artwork is something that evokes thought and isn’t always aesthetically proven but the main purpose is to make the viewer wonder.”

And it’s not just for art students either. Kep Pate, a senior visual arts major, is happy to see Clemson—a
fundamentally science-driven university—more actively seeking to keep art alive and present in response to a policy set by the academic council that requires a 0.5% budget towards public art in new construction by Clemson University.

“It’s another cool way to show how the concentrations on campus can connect with one another. This is one of the only classes where you see architecture majors, art majors, life science majors and engineers all collaboratively working together,” Pate said. “Clemson tries to do that in a lot of ways, and this is another example of how we work together.”

Brittany Lamont, a senior health sciences major, says the experience has completely altered her perspective and has led her to earn a minor in art.

“I’ve been doing this CI for a year and half, and there’s something to be said about actually working with your hands and doing something as opposed to sitting in front of a projector watching your professor tell you how it is and how it goes and to just take his word for it,” she said. “It’s really valuable because instead it tells you how something works first-hand.”

Overall, the Creative Inquiry has created a lasting impression on both the students involved and the Clemson community.

“I hope to be able to come back one day if my kids are here and be able to say that I took part in this,” sophomore visual arts major Jessi Helmrich said.

“All the students enrolled are supporters of the arts,” Manson said. “They have that passion and drive and this enables them to leave a lasting contribution to the campus. Any of those graduating know they will have an impact for a long time to come.”
Re-Inventing the Wheel:
Improving Wheel Traction in Sand and Lunar Terrain
By Alyssa Glazener

In a warehouse, a team of mechanical engineering students is conducting research to be implemented where few undergraduate endeavors venture: the moon. Their work involves improving a wheel that must roll smoothly through sand, gracefully manage rock piles and scale daunting inclines.

The project, led by seniors Steven O'Shields and Zach Satterfield is composed of nine undergraduates. Mechanical engineering professor Dr. Joshua Summers began the Creative Inquiry, Development of Sand Traction Concepts, more than seven years ago.

“The purpose originally was for NASA. It was a NASA-funded project to come up with a wheel,” Satterfield said. NASA developed an All-Terrain Hex-Limbed Extra-Terrestrial Explorer (ATHLETE), a multi-legged robotic platform for transporting large items, such as a living space for astronauts, on the moon. However, since the lunar terrain differs in texture and consistency from the asphalt that most earth-bound vehicles are designed for, ATHLETE needed a new type of wheel on its “feet.”

The average vehicle wheel intended to travel over asphalt is convex, or curved outward. The convex tread pushes debris, which would otherwise cause friction and slow down the vehicle, out from under the wheel. The tread is the shape of the tire’s exterior that creates traction.

“The tread helps you be efficient with moving the vehicle,” Satterfield said. The team has determined that a concave shape, with an indentation around the middle of the wheel’s exterior, is the most efficient shape for moving across sand. This design grips the sand and gives the wheel something more solid to push off of, so that for each rotation, it travels the maximum distance possible.

By testing different wheel designs, the team found that a concave tire covered in non-porous foam moves most efficiently. While they were satisfied with its traction, they wanted to make the tire more durable, because the foam was easily damaged during testing.

“We don’t always get the perfect prototype. Dr. Summers harps on that you learn more from failure than from success,” Satterfield said. To make their product more suitable for extraterrestrial travel, their latest design includes a layer of Kevlar, a strong yet lightweight material, over the foam-covered concave...
tire. The nine student engineers hope that this design will successfully combine an efficient tread with materials strong enough for use on the moon.

The team tested various characteristics of their Kevlar design, such as velocity and endurance, with the longest test running up to ten hours. By passing the durability test, which previous versions had failed, the Kevlar prototype has become their most successful design yet.

Although the project is intended for space exploration, Satterfield and O’Sheilds anticipate that their work will also be practically applied on Earth. Their new wheel could be used on any vehicle that travels over sand, from recreational dune buggies to military transports. It would allow a vehicle to move more efficiently thus using less fuel.

In Aug. 2013, Summers, O’Sheilds, Satterfield and senior Justin Moylan attended a conference for the American Society for Mechanical Engineers in Portland, Oregon. Their paper, which Satterfield presented, was the only undergraduate publication at the conference.

“I don’t think many other schools have undergrad research like this, where it’s run by undergraduate students,” O’Sheilds said. The team looks forward to presenting at more conferences as they continue to determine the weaknesses of their Kevlar-covered wheel and how it can be improved.

The students are the driving force at every level and stage of the project because Summers believes that giving the students ownership of the project provides them with more learning opportunities.

O’Sheilds and Satterfield also gain leadership experience. Along with the other seniors, Moylan, Brett Smenteks and Coleman Heustess, they partner with the students who have not yet taken advanced mechanical engineering courses.

“It’s really a lot of fun working with these people, working with their strengths and weaknesses and trying to get the ultimate goal accomplished of getting a tire that works right” O’Sheilds said of younger team members.
Walking into the Writing Center in the Academic Success Center, it is impossible to overlook the buzz of activity. The sounds of paper rustling and group collaboration are nothing new for the Writing Fellows, a group of impressive undergraduates who help all members of the Clemson community become more confident and effective writers. The Writing Fellows assist undergraduate students, graduate students and even faculty members with all forms of expository writing. By working closely with undergraduates in various disciplines, the Writing Fellows have contributed to Clemson’s recent recognition by U.S. News & World Report as one of nineteen colleges that make the writing process a priority at all levels of instruction and across the curriculum.

Dr. Meredith McCarroll, director of the Writing Center, associate director of major fellowships and professor of American literature, realized that peer tutoring in writing involves more than one-on-one conferences; it involves studying the function and effectiveness of tutoring. McCarroll developed the Writing Fellows Creative Inquiry, a subset of the Writing Fellows program, in which a handful of Writing Fellows immerse themselves in self-led research on different aspects of peer tutoring. The purpose of the Writing Fellows Creative Inquiry is to help students...
conduct and continue this research as they prepare for the National Conference on Peer Tutoring in Writing (NCPW).

The range of research conducted by the Creative Inquiry is exemplified by Caroline Mercer, a senior English literature major. Mercer sees the growing importance of technology and decided to conduct her research on the quality of online tutoring compared to sessions conducted in person.

“This next generation is really techy, so I think that online tutoring will only become more and more prominent over the years,” Mercer said.

Mercer’s fellow Creative Inquiry team member, sophomore industrial engineering major Shannon Kay, is also delving into research that will expand her knowledge of peer tutoring and enhance her own sessions. Kay’s research focuses on sequenced assignments, which refers to the relationships between given assignments. McCarroll believes that such student-driven research is one of the most powerful and memorable experiences that an undergraduate can have.

“It gives students a glimpse of what they can do beyond just one class,” McCarrol said. “Self-guided experiences help students feel autonomous and empowered.”

The semester-long research of Mercer, Kay, and the four other Creative Inquiry team members culminated with the National Confrence on Peer Tutoring in Writing (NCPTW), held in Tampa, Florida in November 2013. At the conference, the students presented their research and had the opportunity to hear ideas from students from other universities. Both McCarroll and Mercer agree that this conference is the most exciting aspect of the Creative Inquiry, as it places Clemson into the growing discussion of peer tutoring and strengthens the university’s emphasis on writing across the curriculum. Returning from the conference, the Creative Inquiry team returned with new ideas and perspectives to share with the other Writing Fellows that they can then implement in their tutoring sessions.

Ultimately, McCarroll hopes that her students will walk away from the Creative Inquiry knowing that they can effectively communicate their ideas and use these ideas to impact their professional work.

“In a large or small way, they have something to contribute –they are going to enter their job and not only do great work, but also help to transform their field,” she said. Both McCarroll and her students believe that peer tutoring in writing is not about comma splices and superficial issues, but rather about content and delivery. It is these two aspects that drive the Creative Inquiry and push Clemson further into the academic discussion of writing across the curriculum.
A group of Clemson students is collecting information on the emission of carbon dioxide (CO₂) from natural and human/artificial sources, and some might consider them trailblazers in this new field.

Geologic Indicators of Climate Change is a Creative Inquiry in the Department of Environmental Engineering and Earth Sciences. A team of geology major seniors is exploring and analyzing CO₂ fluxes from soils, rocks and bodies of water. Using their own individual experiments and observations, these seniors are developing and collecting a new information baseline for the southeastern region.

“Not many people are aware that the carbon flux is of issue”

“There’s not much research in this geologic, climatic, biome. Most of the research is being done in other places. So, we’re right now creating baselines for the southeast,” research assistant professor of Geology, Scott Brame said. Brame, the leader of the team, has narrowed the focus of the Creative Inquiry to a particular region. “We’re focused on a temperate deciduous forest ecosystem found in the southern Appalachians. It’s a narrow scope,” he said.

The main focus is to understand how much CO₂ is produced by humans as opposed to the CO₂ that is emitted by decaying
matter and other natural processes. In order to enhance this understanding, Katie Hickok is performing a lab experiment that measures differences in CO$_2$ emissions from store-bought and natural soil. She manually changes the temperature, moisture and other factors to determine which conditions produce the most CO$_2$. Hickok said that she likes the hands-on experience of working in the field, but for this particular experiment it was best for her to be in a lab setting.

“I thought for me that it would be easier to understand in a lab setting where I can physically change it. Where I am boss, I am God of this experiment,” said Hickok.

Ashley Coffin also believes that her experiment will be of use to farmers in the future. Her research on till versus no-till farming could lead farmers to change the way they manage their crops. Coffin studies the amount of CO$_2$ emitted from tilled soil versus the amount emitted from soil that is not tilled. In “no-till” farming, crops are planted without plowing the soil. This practice is believed to add organic matter to the soil as well as to decrease erosion. She suspects that no-till farming will reduce CO$_2$ emissions the most.

“It would be trying to prove that and then make recommendations to the organic farms saying ‘You should switch and change to no-till,’ in order to reduce CO$_2$ emissions. So (my research) has a real world application built into it,” Coffin said.

The Creative Inquiry group is also conducting experiments on CO$_2$ levels in the water from nearby Lake Hartwell. Lacy has started a data collection project that he hopes will be continued by other students and professionals.

“I’m doing one arm that goes into Lake Hartwell and seeing how much carbon actually comes in through waters and soil samples, leaves falling off trees and how much is actually moving through the water,” Lacy said. Lacy also explains that a lot of the carbon in such a system is from natural sources, such as dead fish and decaying leaves and trees.

As for the continuation of this project, the students and their faculty leaders have high hopes that the information they are collecting will encourage corrective actions towards reducing carbon emissions.

“Not many people are aware that the carbon flux is of issue,” Brame said. “We’re just trying to measure this natural phenomenon.”
When someone first thinks about bacteria and fungi, they don’t often consider them as resources to produce fuels from things such as plants. Dr. Michael Henson in the Department of Biological Sciences and his Creative Inquiry students are conducting research in order to one day build bio-refineries that can produce fuel from bacteria and fungi. These refineries employ a series of chemical and physical reactions to convert plant material to produce various products, including fuels. Biofuels are fuels that originate from living organisms.

“We would want to do that as a bio-refinery by taking those biological products, bringing those biological products into a bio-refinery, and converting those biological products of biomass into a variety of end-products that have value as a fuel or other sectors of the economy,” Henson said.

Henson began this project when he was in graduate school by converting biomass materials into methane, a component of natural gas. Years later, Henson put together a Creative Inquiry, called Biofuels to Biomass, that involves undergraduate and graduate students working on a project that combines basic and applied science. Students in this CI learn more about their chosen field through first-hand experiences and research opportunities. Henson knows that this experience is valuable.

“It is no longer just studying a textbook or copying a lab procedure,” he said. “The student begins to build on these methods and goes into a lab and can see their project and do the work and see their own results.”

The students are now studying the roles of specific bacteria and fungi in the conversion of biomass materials, such as cellulose, into biofuels.
“One part of this research project is to optimize the conditions in the way we mix bacteria, which include temperature, different pH and different nutrient requirements,” Abhiney Jain, a microbiology graduate student, said. “The second part of this project is to understand the relationship between bacteria and fungi as they deconstruct these plant polymers.”

One of the biggest things sophomore biological sciences major Tabitha Banks has gained from the project is the ability to problem-solve.

“I’ve gotten a new outlook on problem solving. When something goes wrong, you don’t necessarily know why it has gone wrong, so it’s looking at here’s what we did, here are the options we can do and it really makes you think,” Banks said. “You may not know what’s going wrong, so it requires you to think outside the box, which will definitely be helpful in future endeavors.”

Banks also reiterated the benefits of working in a lab outside of her regular lab classes.

“I really enjoyed being able to work in a lab because it gives you an insight into many things that you don’t get to do in labs for classes,” she said. “When you go into labs for classes, it’s generally all laid out for you there, step by step, but in here you have the large scale goal for the lab and for the project, but then it’s left up to you.”

Overall, Henson is pleased with the progress made by his students and the time they spend in the lab, learning valuable skills that will inevitably help them further down the road in their careers.

“It is seeing the undergraduate student who has little to no experience in the lab have that discovery moment when they see something they’re discovered for the first time,” Henson said.
Early four years have passed since the earthquake in Haiti. The country of Haiti, though progressing forward in reconstruction, is nowhere near operating at the same speed it was before the 2010 destruction. A group of civil engineering students at Clemson University are developing a way to help restore Haiti. By researching the use of bamboo reinforced concrete, they hope to provide an economical and efficient way for Haitians to rebuild and recover.

Bamboo is about one-third the strength of steel. Although not quite as strong, it is far less expensive and much easier to produce.

“We look into bamboo reinforced concrete because we know that bamboo can be grown in Haiti—it can be grown in just a couple months to get to its full height. It’s basically free and grows almost like weeds,” Dr. Weichiang Pang, assistant professor of Civil Engineering, explained. Pang holds up a piece of bamboo about a foot long and around a half-inch thick. “This can hold around 1000 pounds of force.”

Assessments to test the strength of bamboo include putting a small sliver of bamboo in a machine that continuously pulls at the specimen.

“We test it in the frame there for tension capacity,” Pang said. “So, basically you will pull it apart and we see how much load it will take to break it. Based on that we can see the cross-section and calculate how much pressure it takes to break it. That’s how we’ve found that it is one-third of steel.”

Graduate student Nathan Schneider, pursuing his degree in Civil Engineering, points out the major breaking point of a bamboo.

“Most likely it’s going to break at the node. The bamboo is divided by the diaphragms so, that’s kind of where you can see the fibers are a lot more chaotic, the way they form. That’s generally the weaker part of the bamboo,” Schneider said. At around 1600 pounds of pressure, the bamboo will finally break.

“Well, if you’re falling off a cliff and you see if a piece of bamboo, it’s a safe move to grab it,” Pang said. Because of bamboo’s impressive strength, this Creative Inquiry team is experimenting with how to successfully strengthen concrete structures with the bamboo as that reinforcement.
“The other task we are doing right now is looking at the bonding between concrete and bamboo,” Pang said. “Bamboo is like wood, so it will absorb moisture. So, one thing we need to address is how to prevent it from absorbing moisture when we cast concrete.”

The team is also testing different lengths of bamboo in conjunction with different waterproofing techniques to ensure that the bamboo will be adhesive when cast to concrete. In working with bamboo-reinforced columns, students have created a new technique to bend bamboo.

“We just have a big PVC pipe that we hook up to a steam box and hook it up with a hose,” senior civil engineering major Austin Chalker explained. “It’s almost like a sauna that we can put up to fifteen pieces of bamboo into. It becomes flexible enough where you can bend and touch it side-to-side and turn into a complete circle. Then, we have a form that we just put up to nine at a time in and let it dry for thirty minutes, and it stays in that shape we formed.”

Schneider believes that this part of their research has been very distinctive. “Nobody’s done that before. So, that’s something that we haven’t found any other information about other people ever using,” said Schneider. “That’s been really kind of unique part to this research.”

Pang’s team is also excited to transfer their research into hands-on activities. “Last semester was more research based while this semester’s been cool transitioning into actually putting it together,” Corey Crowder, a civil engineer senior, said. “It’s definitely been a lot of fun. Especially seeing it all come together,” Schneider added.

Once the bamboo-reinforced concrete structures have been tested, the team hopes to travel to Haiti to introduce this idea to the population. Teaching Haitians how to rebuild their structures with bamboo reinforced concrete is now a feasible goal, and this team of students is determined to get there.
There’s a small space in Clemson’s Experimental Forest where a few tall trees tower towards the sky. Covered in long pine needles, the wooded area is open and bright compared to the rest of the forest. A Creative Inquiry team, led by Dr. G. Geoff Wang and Dr. Arvind Bhuta in the School of Agricultural, Forest, and Environmental Sciences, is studying three species of southern-yellow or heart pines (*Pinus taeda, Pinus palustris* and *Pinus elliotti*).
These pines are of interest because of the unusual occurrence they have in this region; these longleaf pines (*Pinus palustris*) are outside of their natural range, which ends sixty miles south of Clemson in southern McCormick and Greenwood Counties, South Carolina. According to historical records, the plot being studied was planted in the 1940s as a source of labor in the aftermath of the Great Depression. Wang, professor of silviculture and ecology, says that there is quite a history of these trees in the South as far back as the 1930s.

“At that time, people didn’t actually study a lot about it,” Wang said. “It was more like, ‘Hey! We got seedlings here! Go plant them!’ It could be they had excessive labor, and they just had seedlings and went planting everywhere.”

One significant characteristic of longleaf pines is that they depend on fire. Without periodic burning, the plant cannot naturally regenerate. Natural and human-caused fire used to occur frequently, but human efforts to suppress fire and the overharvesting of longleaf pine forests in the southeast have caused populations to decline.

Junior forest research management major Carson Barefoot is concerned about this change. “It’s weird because longleaf pines used to be really dominant. They were the most abundant species but then, we stopped putting fire on the ground, and then they started declining,” he said. “And now, we’ve reintroduced fire. And that’s what we’re trying to see—how the reintroduction of fire is impacting these trees.”

Bhuta describes the magnitude of the decline of this species: “Due to the overharvesting of longleaf pine forest and the practice of preventing fires, the longleaf pine declined, going from over 91 million acres to only over 2.7 million acres,” he said.

The team is also studying how climate affects the growth of loblolly, longleaf and slash pines in different regions of South Carolina. They are starting by studying young longleaf seedlings.

Students measure the height and diameter of the tree, and the canopy. Students also “core,” or retrieve samples from the inside of the trees. Using a core sample, the team can identify the age of the tree and how both climate and disturbance have affected its growth. They can also recognize scars from burning. “We just want to have some simple metrics to calculate how many trees per acre are here and go from there to kind of give us an estimate of what’s going on with the life history of the tree,” Bhuta said.

“I want to keep doing research. I want to keep coming out here and helping the trees other than exploiting them for their resources.”

This Creative Inquiry engages forestry students in meaningful research in Clemson’s Experimental Forest. “It’s real world stuff that we would do in a job. So, we get to practice. I like to see how the environment impacts the growth directly in the rings,” junior resource management major Michael Griffio said.

Barefoot enjoys the outdoors aspect and research rewards of this project. “I want to keep doing research,” he said. “I want to keep coming out here and helping the trees other than exploiting them for their resources. I absolutely enjoy it.”
Peoplen often say that there is “something in these hills” — a quote from Joe Sherman’s poem that embodies the way that many cherish Clemson University.

Clemson is a place defined by traditions, both experienced as students and carried on throughout the rest of our lives. Colonel Sandy Edge, a lecturer in the Department of Management, and his Creative Inquiry team developed a project that takes a further look at one of Clemson’s most prominent traditions, prized by graduating seniors and alumni for over a century: the Clemson ring.

The project began when the Clemson Alumni Association approached the Marketing Department about involving students in the development of a new marketing strategy to revive the tradition of purchasing and wearing the Clemson ring.

“In initial discussions with the Alumni Association, we knew that the ring is very, very special,” Edge said. “Now that the Clemson Alumni Association owns, markets and has the total rights to the ring, it’s also an opportunity for revenue interests. They wanted us to go back with a totally unbiased, fresh look and give each area a fresh set of eyes. I don’t think the Alumni Association could have been more excited.”

Creative Inquiry students researched ring sales at Clemson and other universities. They also attended and analyzed Clemson’s Guarding of the Rings and Ring Ceremony held in October.

“The Alumni Association took over the ring within the last two years, and so they’re not really quite sure of what the direction is. That’s where our project fits in,” Creative Inquiry leader Carter McElveen said. “In order to create a good marketing plan, you have to look at where you’ve been. You have to look at the past so that you have an understanding of the past, so you can go forward to the future.”
After reviewing successful and unsuccessful marketing strategies for ring sales across the country and the history of ring sales at Clemson, the students met with the Alumni Association to develop an integrated marketing plan.

“Developing an integrated marketing plan that the students may have to construct once they get to the real world allows students to produce a real world product for a real world project that has definite applications,” Creative Inquiry leader Colonel Ed De Iulio, a lecturer in the Department of Management, said. “It enhances their ability to synthesize all the different pieces and parts of various courses and put them together.”

The Creative Inquiry not only produces a real world product for the Alumni Association, but also functions as a business with a class-elected CEO and designated project teams and managers. Student members of the Creative Inquiry work collaboratively to develop a marketing plan for the Clemson ring.

“It’s about something I’m so passionate about,” class CEO and junior communication studies major Morgan Burns said. “I think it makes it even more interesting and intriguing because I feel like it’s not just a Creative Inquiry that’s personal to me, but personal to my parents who are alumni, and it tangibly affects every student who comes through Clemson’s campus.”

McElveen believes that her love for her alma mater and students was what influenced her to get involved in the project.

“I couldn’t resist getting involved in something that would benefit the students by allowing them to see first-hand how to make a marketing plan and how to improve something they truly care about,” McElveen said. “To me, your ring is your lifelong connection with Clemson and it’s everything: the tradition, all your memories—everything wrapped up into one thing that is Clemson. If I can help make the ring a better part of the tradition here, I want to help do that.”

The success of the Creative Inquiry team was fueled by the students’ enthusiasm to enhance Clemson tradition.

“I’ve never been amongst a group of students who are honestly so passionate,” Burns said. “There is not one person in the class who does less work than another. There isn’t a student who isn’t excited to get dirty and get their hands wet and get excited about it.”
You open your mailbox. You pull out the usual coupons, advertisements, and bills—nothing new, interesting or eye-catching. The next day, your mail includes a brochure from your alma mater containing your name, the number of months and years since your college graduation and the top ten things that occurred in your graduation year. You are probably much more likely to take a second look.

Even before Clemson University started the Creative Inquiry program, Dr. John Leininger in the Department of Graphic Communications, recognized the importance of exposing students to the kinds of tasks they would encounter upon graduating from Clemson. To do so, he created an independent study that allowed undergraduate and graduate students to create graphic design marketing projects and then analyze variable data on the impact of the projects.

Leininger elaborates on the concept of variable data by pointing to the personalization of past projects. He describes the data as taking a piece of printed work and merging it with a database in the attempt to trigger new information. Past projects have used databases to tailor alumni communications to the alumni themselves, such as including information specific to a certain graduating class.

In recent years, Leininger’s independent study has developed into a Creative Inquiry in graphic communications with variable data. This Creative Inquiry maintains the original focus on real-world experience while also helping the Clemson community.

“In almost every research project we do, we are working with a group on campus or in the local community on a live project that has value and can improve their marketing efforts,” Leininger said.

The team is currently working on a project for the Clemson University Alumni Association by first designing different types of mailer packaging. They are planning to collect response data and analyze how many alumni open each of the different mailed packages. By introducing incentives, the team hopes to encourage more alumni to open the mailing while also gathering more accurate data about who opens it by tracking responses to the incentives. For example, by opening one of the envelopes in the mailing, alumni can enter an online drawing to win Clemson memorabilia, such as an autographed football from Dabo Swinney or a framed Clemson print.

This endeavor is receiving support from four different business and campus organizations. Jubilee Brands,
a printing company, is donating the printing of the envelopes; the Creative Inquiry funds are covering postage; the Alumni Office is assisting with logos, envelopes and a database of recent alumni; and the Graphic Communication students are doing the design work and mail preparation. Thanks to the involvement of these organizations, the students will gain valuable experience as well as the opportunity to publish their results in a marketing journal next spring.

Last year, the Creative Inquiry group worked with the Alumni Office on another printed mailing project—targeting alumni from the classes of 2006-2008 to raise funds for the Senior Sidewalk Project, which engravcs the names of donors onto sidewalks around campus. They used a formula to determine the years and months since graduation for each recipient and placed that information at the beginning of each brochure to catch the readers’ attention. By similarly inserting specific information throughout the brochure, the Creative Inquiry students hoped to increase the Alumni Office’s impact.

Senior graphic communications major Hollie Taylor believes this project has great value for students who want to expand the benefit they receive from their education.

“I would recommend taking this Creative Inquiry because not only do you gain experience with mail, you learn more about planning a project from start to finish and setting a timeline to get tasks accomplished,” she said. Senior Sarah Grosse, also a graphic communications major, also values being able to work on a project outside the classroom.

“I think the most valuable part of taking the class is that it has real world applications,” she said. “We are getting to work on a project that is actually going to be sent out to people, rather than just doing a project in class.”

A project that began as an independent study has now blossomed into something much larger. With the help of variable data and the students’ hard work, this Creative Inquiry is now an ongoing project that produces work of real value and provides a professional experience for students before they enter the work force.
Don Corleone of “The Godfather” said it best: “I’m gonna make him an offer he can’t refuse.” Dr. Margaret "Margie" Britz, in the Department of Sociology and Anthropology, made Clemson students an offer they could not refuse—exploring the factual history of gangsterism during the 20th century.

With all of the historically inaccurate portrayals of gangsters, it takes a trained eye to set the facts straight. Britz, a professor of criminal justice, and her team of 40 students are studying gangsterism as a film genre, in order to better understand the behavior of criminals. The project began as a way to facilitate knowledge about the criminal justice system because Clemson does not offer a criminal justice major or minor.

From Italian to Irish to Russian gangsters, Britz and her students cover them all. Over the course of a semester, they evaluate eight to 10 films, covering themes such as good versus evil and dynamic roles in society. She finds these themes interesting because everything is connected when examining the structure of an organized crime. According to Britz, “We look at these notions of good versus evil and how they’re not necessarily attached, or they’re not necessarily universal nature. [The notions of good and evil] are largely attached to roles in society.” The Creative Inquiry students compare and analyze overarching themes and morals in the films. “I think it really leaves them to critically analyze how we develop what constitutes a good behavior as opposed to a bad behavior,” Britz said.

Students watched well-known mobster movies that portray organized crime such as “The Departed” and “We Own the Night.” After every film, the group analyzed what they watched by focusing on character development and how accurately the film portrays organized crimes. Cameron Foster, a senior sociology major, believes that each time period influences the gangster as well as how the producers portray them in the films, “Seeing the progression of society and the representation of the mob bosses as either a hero or villain is something special,” Foster said.
The films also prepare students for a visit to prominent ‘gangster’ sites. For seven years, Britz and her students have traveled to New York City during the summer in order to further their knowledge on the subject. The trips allow students to see some of the locations that they studied, meet experts on the subject of organized crime and gain insight into the immigrant experience. “[The trip is] a capstone experience where some students are able to see some of the sites that we talk about in the books or in the films and that we actually talk about in real life organized crime,” Britz said.

Students visited New York City landmarks including Ellis Island, Harlem and Brooklyn. “[Traveling to New York] gives young people the opportunity to appreciate the immigrant experience because so much of what we watch deals with the immigrant groups in the U.S. and how although the mass majority of them were engaged in of them law abiding behavior,” Britz said. During the 2012 summer trip, students compared counterfeited merchandise from Chinatown, met with FBI agents and the NYPD and visited the 82nd floor of the One World Trade Center, formerly known as the Freedom Tower, while it was still under construction. The unlimited access to famous, secure New York sites is made possible by the astounding connections Britz and her Creative Inquiry team have established over years of operating the project.

“Organized crime has always been my specialty and my passion. I want to give students the opportunity to network with people they typically wouldn’t have access to, so it can help them develop contacts who can help them in the future,” Britz said.

From the films to the big city, one thing is for certain—seeing is truly believing. “You can take the class; you can learn about things like you can hear about what people do when they first came over and how culture has…but you don’t really learn about it until you see it first hand,” Michael Savino, a senior sociology major, said. “It teaches you a lot about these cultures.” Learning about these cultures is important because there are limits and boundaries for gangsters within each organized crime subculture. “If they abide by those rules in that subculture, we actually consider them to be a good person,” Britz said. “Society as a whole, when they step back and look at that, they can also appreciate that this is an individual who is caught in this part of society where you have a larger part of society who would consider this as evil, but you also have a smaller part where that reinforces their behavior is actually good.”

So the next time you watch a movie about gangsters, leave the gun and look past the stereotypes and myths because there is more than what meets the eye.
In the basement of Holtzendorf Hall on the Clemson campus, there is a lot of noise. Dr. William Park, associate professor of electrical engineering, and his team of nine students create the clamor while working on a project that will take them through the process of designing, building and mass-producing synthesizers.

“I have been interested in music since I began to learn piano when I was five years old,” Park said. “I began building electronic ‘doohickeys’ from kits when I was about twelve [and] I began building my first synthesizer from scratch—work which I eventually turned into my master’s project.”

Students working with Park come from a range of interests and experience, which are similar to his own. Walker Hagan, a freshman bioengineering major, is also interested in the correlation between music and science.

“Music is a hobby of mine so analyzing the theory of sound and the physics behind it all is interesting, especially when I can manipulate it through a keyboard. Simply listening to the sounds we can create with manipulations of voltages astounds me,” Hagan said. Mary Lawrence Thomson, a sophomore electrical engineering major agrees.

“I am a music minor, so it has been a really great way for me to combine my major with one of my other interests.”

Park describes the project as an ongoing attempt to deepen students’ knowledge in musical instruments and the engineering behind them. The goal of the project is to give students the opportunity to use hands-on experiences to learn about the mass-production of synthesizers, which are electronic musical instruments used to produce a wide variety of sounds. They are often controlled by a keyboard, which is how Park and his students control their machine. Park also hopes to illustrate the overall design process—from concept to marketable product—to his students by allowing them to learn various tools and techniques in the design and construction of electronic circuits and user interfaces.
“We don’t just design the circuit boards, but we also get to learn how to use the circuit board software, print out the design on the boards, etch the boards, design the graphics for the panel, and then install the individual panels into the final synthesizer,” Thomson said.

The beginning of the process involves designing and building circuit boards that control one aspect of the instrument. Students use trial-and-error to fine-tune their circuits and then move on to larger, more complex boards that will come together in one machine to control all functions and sounds. Engineering is not the only part involved in building these synthesizers; each instrument’s exterior appearance also plays an important role.

“From the standpoint of usability, a logical panel design is probably more important than pure aesthetics, but making it attractive does help to market a product,” Park said. “It not only sounds cool, it looks cool!”

As Park and his team continue working and learning, they will have first-hand experience that will eventually lead to the construction of the final synthesizer. The hands-on approach of the project has become an important way for students to practice what they learn in the classroom.

“I’ve learned more in this Creative Inquiry than in my electrical engineering coursework, so it has definitely helped me understand the practical sense of engineering,” Hagan said.

Most of all Park is happy to see his students having fun. “Essentially every student had the same reaction when they successfully hooked their first simple circuits up to the [test synthesizer], ‘That’s really cool!’”

“I’ve learned more in this Creative Inquiry than in my electrical engineering coursework, so it has definitely helped me understand the practical sense of engineering.”
The strong support system provided by the Clemson family is invaluable in times of need, such as when the Clemson family loses one of its own.

Drug and alcohol abuse pervade college campuses across America and, in some tragic cases, have contributed to the deaths of students. According to the National Institute on Alcohol Abuse and Alcoholism, approximately 1,825 college students between the ages of 18 and 24 die each year from alcohol-related unintentional injuries.

The Greek community has vowed to take a stand by initiating a culture change that will not only lower the number of student deaths, but also improve student awareness of the consequences of drug and alcohol abuse.

Parker Rhoden, a senior brother of Beta Theta Pi and Clemson’s Student Body Vice President, was the first student to propose a Creative Inquiry project to target these problems on Clemson’s campus. Rhoden first became motivated when he served as president of the Order of Omega, one of five Greek councils at Clemson, during the 2012-2013 academic school year. Rhoden and his fellow Greek leaders were challenged by administrators to address the drug and alcohol problems in the Greek community. Rhoden responded by working with Jennifer Goree, the director of Healthy Campus, to form an all-Greek Creative Inquiry: Greeks Against Drug Use and Alcohol Abuse.
"Clemson students in general and Clemson Greek students really have embraced the idea of leadership and service."

“It [drug and alcohol abuse] is something that bothers me because it is so prevalent. Students think that they are invincible. We have to change that idea,” Rhoden said.

Rhoden and Goree, along with Meredith Jones, a graduate assistant, decided to begin this work by gathering data on the issue through focus groups. As the advisor of this Creative Inquiry project, Goree aims to give the students as much freedom as possible to gather information from their peers. They spent the fall semester clarifying their mission and goals and working with the Institutional Review Board to get approval to proceed with their data collection. The 14 Creative Inquiry members are facilitating the focus groups in hopes of giving the members of Clemson’s 42 Greek chapters the opportunity to discuss how they believe drugs and alcohol are negatively impacting the Clemson community. The Creative Inquiry group contacted chapter presidents and visited chapters to discuss the project.

The Creative Inquiry team conducted the first round of focus groups in Spring 2014. Once they analyze the student responses from the focus groups, the team will set up multiple projects to address the conclusions they draw.

Goree has high hopes for the potential impact of this Creative Inquiry.

“I think it would be really inspiring to see the Greek community of Clemson be a national model of how a Greek community can actually lead an entire campus to be a healthier, safer and better place to live, learn and work,” she said.

The ultimate goal of Greeks Against Drug Use and Alcohol Abuse is to decrease the rate of consumption at Clemson and, instead, promote protective, responsible and safe behavior. The students in this Creative Inquiry hope that Clemson’s Greek community will strive to fight against the common stereotypes by which non-Greeks or media may characterize Greeks.

“Clemson students, in general, and Clemson Greek students really have embraced the idea of leadership and service,” Goree said. “I think if you put the two of those things together, it’s a wonderful opportunity for that group of students to inspire the rest of campus to be the best that you can be.”
Pedaling Towards a Healthier Lifestyle
By Alyssa Glazener

The seat is not very comfortable, but it feels sturdy. It’s strange, at first, to be astride what looks like an exercise bike and not break a sweat. For Dr. June Pilcher, professor of psychology, and her Creative Inquiry team however, using the low intensity FitDesk bike has become a frequent habit. “The real effect is in the long term and in general fitness and how that impacts your ability to learn and work and think,” psychology junior Phil Smith said.

“It’s a stationary bike with a desktop. They’re affordable. They’re amazingly sturdy,” Pilcher said. A FitDesk allows its user to be active while working. However, its purpose is not to burn calories. Rather, the team believes that using the FitDesk increases focus and attention. “I think that the movement, not only does it make me feel more positive when I’m doing something that I know I need to do. It makes me more attentive while I’m doing it, it makes me more focused while I’m doing it,” Pilcher said, who hops on her FitDesk several times a day to read short scientific articles or emails.

According to Pilcher, this effect occurs because the body is partially in motion. Walking-like movement from the legs signals the brain to be alert. Normally, the brain would need to scan the horizon and avoid obstacles. Since the upper body is still, the brain is more relaxed. This combination prompts the brain to a level of alertness ideal for focusing on a task like reading a book.
Pilcher believes that the human body is meant to be in frequent, low-level motion. For example, ancient hunters and gatherers walked all day in search of food. While the modern concept of exercise, ninety minutes of intense calorie burning at the gym, is healthy, it does not give us the full benefits of frequent, low-level motion.

The eleven undergraduate psychology students in the Creative Inquiry began the project in the fall of 2013. First, they became familiar with previous research on the positive effects of exercise and assembled the fifteen FitDesks that are now on campus for anyone to use. “We’ve thought about looking at the correlation between GPA and how often someone uses the bikes,” Smith said.

“I’m always looking for a more efficient way to study,” Smith said. To him, the most interesting benefit of the FitDesk is how it may increase the speed and retention rate of reading study materials.

“It’s doing your own work but realizing that your own work is not the only thing that is going on, and that you can’t even do all of your own work by yourself. You have to bring in the rest of the team... It’s a really good way to realize that you do have peers, almost colleagues, transitioning into that,” Smith said.

“Try it out and see what you think,” Pilcher invited.

“Start to tell your friends, if you like it especially, bring your friends... People just need to try it, to just try it for a little bit. You try it for a little bit, and I think you’ll see benefits.”
During adolescent years, students read books that may reflect personal issues. Whether it’s during junior year of high school and one envisions prom night to hold the glamour of Gatsby’s party, or whether one is in the midst of middle school awkwardness that Jerry Spinelli captured so clearly, it’s likely that you related to at least a few of assigned readings. The Creative Inquiry, Teenage Triumphs and Tragedies: Using Adolescent Literature as Lens to View Our Lives, studies the readings that best improve the link between books and adolescent emotions.

Creative Inquiry advisor Dr. Kathy Headley, interim director of the School of Education, and her students meet bi-weekly to in order to discuss adolescent novels. Books are selected from professionally recommended book listings of award-winning and highly ranked selections, as well as popular reads among adolescents. The Creative Inquiry team members select four books that the group will read and one book to read individually. Previous readings include October Mourning, Blue Plate Special, the Twilight saga and The Hunger Games trilogy—some of which focus on serious topics such as bullying, cancer, violence and mental health.

“The books we are reading may have fictional problems and fictional characters but, the problems that they have can be related to someone's life, or my own life.”
Donnie Wilson, a senior who is double-majoring in English and secondary English education, believes that the book characters’ problems highlight challenges in everyday life. “The books we are reading may have fictional problems and fictional characters, but the problems that they have can be related to someone’s life, or my own life,” she said.

Group discussions frequently focus on whether a current book is appropriate to teach in a classroom setting or if it would be better located in a library where students can read it on their own time. Justin Holliday, a graduate student pursuing his Masters in English, believes that this project will impact his future as a classroom teacher.

“I have learned more than I had originally thought possible,” Holliday said. “I learned what kind of young adult literature I would like to integrate into my curriculum because I learned that this type of literature is worthy of study, whether in a secondary or post-secondary classroom. I am fascinated by the motif that promotes hope even in the darkest novels.”

By using adolescent literature as a lens to view lives, the group discusses their future classrooms and ways to help adolescent students deal with personal issues through assigned readings.

This Creative Inquiry team refers to themselves as a “book club” because they all share a love of reading and appreciate the opportunity to read literature together. Headley believes that she and each book club member operate with an emphasis on student leadership and an overall goal to understand the impact of adolescent literature on students.
Flashback to childhood and explore the events that made your hometown unique, whether they were festivals or fairs, visiting attractions or frequent showcases. For many, these fond memories include recollections of the distinctive cuisine such events were known for.

Over the past three semesters, Parks, Recreation and Tourism Management (PRTM) students on the Culinary Tourism Creative Inquiry team have traveled to and studied local food festivals around South Carolina while, of course, experiencing the unique fare each has to offer. The team is led by graduate student Jen Calabria, Dr. William Norman, and Dr. Teresa Tucker in PRTM.

From the Low Country Cajun Festival of James Island and the World Grits Festival of St. George, to the Rice Festival of Walterboro and the BBQ and Shag Festival of Hemingway, each South Carolina food festival provides students with hands-on experience in the interviewing and research styles used in the parks, recreation and tourism fields.

“We’re doing something that I think, out in the real world, a consultant would be paid to do. Because we have three semesters to do this, we’re producing a really high quality product, and the students are getting to see how much work it takes and what the expectations are, not just for school, but if they wanted to go into tourism research,” Calabria said.

Senior Jessica Kicklighter, a member of Culinary Tourism for two years, commented on her exposure to tourism research and the impact the creative inquiry has had on her professional skills.

“We developed our own research question and were in charge of developing a way to collect data,” she said. “We contacted festival coordinators, volunteers and prominent members of the community where the festivals were being held. We had to represent Clemson well and represent our Creative Inquiry well. We set up interviews and gathered information from these individuals over the phone and via email. My formal communication skills and interview skills have definitely improved as a result of my Creative Inquiry experience.”
At each local festival, students explored the perceptions of the residents in the area through in-depth interviews.

“It was interesting to watch the students evolve through the interviewing process at each festival, going from being fairly timid at the beginning, to having much more confidence at the end,” Calabria said. “I really enjoyed watching them become engaged with the people they were talking to and what they were doing.”

When it came to the locals at each festival, students were interested to find out their perceptions of food festivals and to explore what made the festivals ‘local.’ Surprisingly, students found that the main attraction of each festival was not the tasty treats.

“The localness of these festivals comes with the fact that the residents who attend them have been doing it for 25 years. They go to see their friends, and their families come back to these festivals because it’s a habit; they’ve always done so,” Calabria said. “As an outsider, you may not be part of the localness, nor might you be able to identify it unless you were like us and you were asking questions. The social component is what’s local.”

Taking on an outsider’s perspective has allowed students to stand in the shoes of a tourism manager, to experience the type of research that goes into developing and improving events.

With the research compiled from each festival, students created reports that were sent to the festivals to suggest areas of improvement. Aside from enjoying amusement rides, funnel cakes, crafts and festival cuisine, students in Culinary Tourism craft a real world product that explores the unique aspects that define the festivals that make hometowns unique.

“It’s a lot of real world experience.”

“They’ve had to interact with people who are running festivals. They’ve had to come up with a plan to get something done, and then execute that plan. They’ve had to step out of their comfort zone to ask people if they would allow them to be interviewed, and then deal with that interview, whichever path it should go down,” Calabria said. “It’s a lot of real world experience.”
What happens when you breed purebred dogs? Sometimes the outcome is excellent, but some may be afflicted with one of the more than 600 hereditary diseases that affect dogs. In order to inform breeders about the chances each litter has of inheriting different diseases, genetic counselors must explain complicated genetic equations to dog breeders.

The Creative Inquiry, Genetic Counseling for Dog Breeding, was designed to bridge the gap between the field of genetics and dog breeders. Two Clemson researchers, Dr. Alison Starr-Moss and Dr. Leigh Anne Clark in the Department of Genetics and Biochemistry, have studied canine genetics for fifteen years and spend a lot of time talking to dog breeders.

“When you talk to the dog breeders you realize that the majority of them don’t have a strong grasp on genetics. The breeders are sometimes surprised at what they get when they breed the dogs, so we spend a lot of time explaining how certain genetics works,” Clark said.

The Creative Inquiry project originated with a plan to develop a brochure that clarified the common misconceptions that dog breeders have about genetics. The brochure would help the genetic counselors explain certain concepts using illustrations and Punnett-squares as visual aids. Starr-Moss and the students met with genetic counselor Lori Bassett at the Greenwood Genetics Center to learn how to communicate successfully with dog breeders. Bassett heads the Center’s Communications office and helped the students explain complex genetic equations without the use of medical jargon.

“I have learned about the public and how much they know about genetics. This CI has taught me how to speak to others about genetics in a way that they will understand without having had any genetic education,” Erin Peterson, a junior genetics major, said.

In order to write the brochure, the students travel to events to interact with breeders and research what they know about genetics. Teaching genetic concepts without the genetics language is, according to Clark, “a lot like the game Taboo, where you have to get the person to say a word without using certain words.”

The students conducted a short survey at the Fall Tailgate for the College of Agriculture, Forestry and Life Sciences and collected data for their brochure by giving attendees “puppy chow” snacks in return for answering basic genetic questions. They also interviewed breeders at a show sponsored by The Atlanta Golden Retriever Club Agility Trial at Clemson’s Garrison Arena.
The students learned that some breeders don’t want to address genetics, but some breeders are extremely interested about what the students have to say and have questions for them,” Clark said.

Sophomore Genetics major Alex Davis observed, “I’ve learned a lot about the various diseases that breeds of dogs are susceptible to and how very little breeders understand these diseases.”

The students plan to set up a website where visitors may anonymously log in and ask genetics questions. The website would explain concepts in more depth than the brochure.

The students believe that this website will be more effective than the brochure and interviews since some breeders are reluctant to ask questions about genetics and breeding at shows. Next year, Starr-Moss and Clark hope to give their CI students more opportunities to travel and get hands on experience with dog breeders at shows and events.

“One of the problems that we faced in the beginning was when we realized students didn’t know dog breeds,” Clark said. “You can’t send a genetic counselor over to a dog breeder, and have them ask, ‘What kind of dog is that?’ Then you have lost credibility with the dog breeders.”

Clark believes the Creative Inquiry will inform breeders about genetic concepts and give breeders and students the tools for successful communication.

“A lot of what we do is rewarding when we get a chance to talk to breeders, when they actually start to understand what you are trying to explain and you can see that something has just clicked,” Clark said. Once they understand the basic concepts, breeders can see that this is just simple genetics.

“A Punnett Square Predicts Outcomes

Parents

Homozygous Dominant

Carrier

Carrier

Homozygous Recessive
Would you be more motivated by a challenge to complete a task as quickly as possible, by trying to keep yourself safe, or by concentrating on how your actions are helping to save lives? Welcome to Courage Research, a Creative Inquiry project led by psychology professor Dr. Cynthia Pury.

Participants in the experiment believe that they are contributing to life-saving research by testing the dexterity of gloves for rescue divers. Senior psychology student Lauren Brotherton measures the amount of time it takes for the subjects to assemble magnets when their hands are submerged in buckets of room temperature water versus their assembly time with ice water. At two to four degrees Celsius, the ice water is cold enough to cause the participant pain.

However, Brotherton and her team are actually measuring the amount of time the participants are willing to endure physical discomfort for a worthy cause, not how long it takes them to complete the tasks.

“What we test is noble courage and people’s willingness to participate in an uncomfortable task if they think that it’s for a noble cause,” Brotherton said. “Sometimes they’ll quit; I’ve had people say before, in the ice water bath that they wanted to stop but they wouldn’t because they’re, ‘Well if it helps save lives, I’ll try to keep doing it.’”

“We are working to develop, test and refine a theory of courage that will allow us to help people become more courageous when they need to be,” Pury said. Her overarching goal is to find a measure of courage. “It’s when someone is voluntarily taking a risk to pursue a noble goal,” Pury said, explaining the definition of courage that her team uses.

For an act to be considered courageous there must be a worthy goal that one is attempting to achieve, and there must be a significant amount of risk involved in the endeavor. In Brotherton’s study, the story about life saving research for rescue divers creates a worthy goal, and the discomfort caused by the ice water is a risk.

Pury, Brotherton and their team members hope to find that the subjects who are motivated by the life saving aspects of the study are willing to keep their hands in the ice water longer.

Pury became interested in courage when she was preparing a seminar on fear and horror and found that little research existed on courage. She now leads several projects in which students like Brotherton are intensely involved in a specific study on courage, the results of which will contribute to Pury’s work in the positive psychology field. For example, undergraduate psychology student Shar’Dane Davis is studying courage in sports.
Other studies include survey-based research on defining the process of taking courageous action, understanding how emotions affect perception of courage and understanding cases of “bad,” or socially frowned upon, courage. The students write questionnaires and code the responses into usable data.

Like many Creative Inquiry professors, Pury gives her students autonomy over their projects. Brotherton and two other undergraduate students run the rescue diver study on their own, which takes about an hour per participant.

“If you go to graduate school in psychology, you pretty much have to do some kind of research, so it’s good to have that experience going into grad school,” Brotherton said. When she had an idea to add an extra condition to test in the experiment, Pury encouraged her to include it.

“I’m really hoping they get the sense of excitement that I got when I was an undergraduate and started getting involved in research that might end up in textbooks and might influence the field as a whole,” Pury said of her Creative Inquiry students. “This is really students’ opportunity to work on projects that really matter.” She recommends that students get involved early in a Creative Inquiry; because scientific studies can take years to conduct, students get more out of their experience when they work on a project for multiple semesters.

“It’s kind of cool to be in a research area that I’m passionate about too, and that it know will help me, moving forward,” Brotherton said. She finds that being part of the latest research on courage is exciting. “It’s cool to see where it’s going, what new knowledge is going to be coming out and things that are going be published.”
Can You See The Rain?
By Colby Lanham

Rainfall, itself, seems like a simple concept, but have you ever stopped to think about how hard it rains, the amount that falls or even how a raindrop is shaped?

In the Creative Inquiry project High-Speed Imaging of Rainfall, undergraduate students collect images to investigate raindrop shape, size and fall velocity. They then analyze these images in the context of the environmental factors and processes that govern these raindrop characteristics. By doing so, this project may identify measurement errors in polarimetric weather radar, a type of radar used to locate precipitation, calculate its motion and collect rainfall amounts.

This research is funded by the National Science Foundation and designated as Award No. AGS 1144846. It is offered as a Creative Inquiry project to support the project’s goals to integrate teaching and research and help develop the pipeline of well-educated, research oriented students who will pursue graduate studies in this field of study.

Undergraduate students are involved in every facet of the research. Students help to establish field sites, learn how to properly install the rainfall instruments, analyze data and participate in writing reports. Rain data will be collected over a two-year period with the goal to analyze as much rain as possible.

During their project meetings, students discuss their research progress and findings with the team leader Dr. Firat Testik, an associate professor in the Department of Civil Engineering. Once the data is collected, studied and processed, Testik and his students intend to publish their findings and present them at professional conferences.

Testik regards the development of thinking skills as a fundamental part of this Creative Inquiry project. He also believes that working on this project will develop students’ originality.

“I want to keep the Creative Inquiry a little bit open-ended, and if there is a good problem we identify, I want us to follow that problem and seek some answers,” Testik said.

Testik’s students enjoy the practical experience they receive from this project. “I get to see hands-on experience. Every week we meet, we bounce ideas off each other so you’re actually in the process of coming...
“Every week we meet, we bounce ideas off each other so you’re actually in the process of coming up with the solutions at the end of the day.”

Karuiam Booker, a senior civil engineering major, said.

Fellow senior civil engineering major Eric Hall shares his classmate’s opinion and also likes seeing the results of their own technology.

“Throughout this project, I encourage all of the students to be involved in publications through conferences, especially undergraduate research conferences,” Testik said. “I want them to send abstracts, posters or papers to these conferences and attend them as finitely as possible. I want to integrate this research as part of my teaching, so I see this as a great opportunity for undergrads to be exposed to a research environment, as it is important if they want to do research-based work as a career after graduation.”
Legos, Tinkertoys, Foldit, and Leap Frog—as children we played them all. The games were a part of our childhood, and at Clemson, they are here to stay. Co-instructors of the Games for Material Sciences Creative Inquiry, Dr. Sapna Sarupria in the Department of Chemical and Biomolecular Engineering and Dr. Joshua Levine in the School of Computing, and their student team are developing virtual environments that help simulate and visualize molecular structures by creating games to explore the virtual world.

“The idea of using what we do in simulations for graphics came about while doing my PhD because I was involved in a project that did exactly that—it used simulations to make animation movies with the goal of teaching children about states of matter, and I wanted to extend this to games,” Sarupria said.

Since the beginning, Sarupria and Levine have wanted an interactive environment and using games represents this idea.

“Informing, from a researcher’s point of view, can mean lots of different things. It can mean how we get to the latest results, and how we decide that a particular gene is the one that causes people to go bald,” Levine said. “It can also mean how we educate and how we communicate certain things, so I’m very interested in graphics and how you can use visual tools to inform.” Sarupria also agrees that an interactive environment helps teach students better.

“Games are educational in the sense that they teach you the basic principles. But the cool idea about them is the fact that they also can do things that cannot be solved yet,” she said.

The class is made up of computer science and chemical engineering majors. “Sapna and I have used this as an opportunity to also reach out to a broader community at Clemson, who’s interested in games and interested in doing research associated with them,” Levine said. The class brings together both majors and uses their skills efficiently.

“It’s kind-of like a separate research project in what’s the right way to get undergrads in different fields to speak the same language and collaborate,” Levine said.

 “[You have] to be willing enough to participate in the other conversations,” Sarupria said. “It’s hard for the ChemE’s to catch up with the computer science students because we’ll be focusing on coding the game, and at the same time it’s hard for the computer science guys to keep their laptops aside and talk chemistry. It takes a lot of figuring out to get them to talk to each other and to participate actively in each other’s roles.”

“I’ve been working on Eclipse. We went through different languages and engines and spent part of the semester focusing on what language and engine to code this in,” Timothy
Campbell, a junior computer science major, said. The Creative Inquiry is set up into two different project teams. One team has been working on ChemQuest—a game that teaches basic chemistry to various age groups, including high school and undergraduate students. By participating in games, solving puzzles and applying what they learn about reactions, the students learn the subject in a fun way by solving puzzles and later applying what they learn about reactions. The other team has been working on MolLego.

“The idea is essentially that they are making Lego-like building blocks, but the blocks are actually molecular structures,” Campbell said. In this game, the team attempts to develop different types of particles by using physics rules in order to see what kinds of structures are produced as a result. However, these game ideas were not always the plan for the team.

“There’s science in how you design stories.”

“We went through various design games. Our original plan was a bubble shooter,” Campbell said. “We were going to shoot particles and molecules, and if you get hydrogen atoms and oxygen atoms, they would react and make water.”

But the games are more than coding, molecules and fun. It is a way of storytelling.

“There’s science in how you design stories,” Sarupria said. Like books, games tell a story. Games emerge into the realm of transmedia by encompassing a universal story that one can fully immerse themselves in through different levels of each game.
In the experimental kitchen in the basement of the P&A building, twenty students in aprons are busy chopping, washing, and draining an assortment of colorful foods. But Dr. Margaret Condrasky R.D., associate professor in the Department of Food Science and Human Nutrition and her Creative Inquiry students are interested in more than just making a tasty meal. With childhood obesity on the rise, these students are vigorously working to create a nutritious and delicious food products that will put children on the path to healthy eating.

It takes a lot to help kids to eat correctly. With the support of a grant from the United States Department of Agriculture (USDA), Condrasky is leading a team of students from packaging science, nutrition and food technology majors to tackle this urgent problem. The Creative Inquiry students are tasked with creating food low in sodium, sugar, and fat but high in flavor and kid appeal. For this project, the students are given guidelines to create healthy food products.

“There is no single definition for what is considered healthy. We know what kids need so let’s make it and give them what they need, and make ingredients that they can taste and understand,” Condrasky said. The Creative Inquiry students are currently focused on creating whole grain, low-sodium and low-sugar foods.

For many of the students, it is their first time being in such a kitchen. Ashley Fowler, a packaging science major, believes this project is a great learning experience.

“I think it is a great opportunity to integrate different parts of food packaging because when we actually go out into the workforce, we will be working with different people and not just packaging,” she said. Students have the opportunity to create a product either for retail or for a food service sector such as school cafeterias. Graduate student and team leader Alexa Weeks believes the school food service system is struggling financially to support healthy food. One group of Creative Inquiry students is creating an entire weeks worth of healthy menu options for elementary school children.

This Creative Inquiry is unique in that it exposes sophomore level students to industry standard processes and machinery long before they take senior level classes. Students begin with the Stage Gate Process for Product Development by conducting a thorough market analysis to see if this idea seems to be something that the market would support. Students look at possible competition, as well as whether the product has the potential to be profitable.
The students begin by working in the culinary science research lab using basic ingredients that one could buy at a grocery store, and next move to working as they would in an industrial pilot kitchen. These ingredients are supplied from manufacturers that produce food items for food companies. This culinary project differs from other programs in that it integrates the packaging science elements early in the product development process. Packaging can affect food’s nutritional profile and these students focus on preserving nutrients.

“There are ways to maintain nutritional values through packaging. The fact that we are pulling these students together and sharing that with them at a young age means they are more aware of it and can help reduce loss of nutritional value,” Weeks said.

Students have gone to both Popeye's and Denny's headquarters to speak with industry professionals about food production.

“One of my goals is to help my students close the gap between academia and industry. If there is anything I can do to bridge that gap, that’s what I’m going to do,” Weeks said.

During a trip to Chastain Road Elementary, in Liberty, South Carolina, the Creative Inquiry students also had the opportunity to have children taste-test their creations. The children loved the dinosaur shaped cookies called “Dino Bites” created with zucchini and carrots, with around 140 calories in four cookies. Devaun Walker, a sophomore packaging science major and one of the Dino Bite creators, believes there are benefits to being a part of this Creative Inquiry.

“We are essentially set up as a research and development team, so that kind of exposure is what other students wouldn’t get. It’s a lot of independent work so it helps me grow gradually as a professional,” Walker said.
3-D printing has an almost science fiction air to it with its promise of bringing a digitally generated design into the real world. From the creation of dolls to functioning guns, engineers have been exploring the uses of this technology, and fifteen students within the disciplines of architecture, computer engineering, construction science and management, industrial engineering, mechanical engineering and material science from Clemson University are eager to expand on these possibilities.

Dr. Todd Schweisinger in the Department of Mechanical Engineering is excited to see what his students are capable of creating. “I like to give the students a little more freedom to succeed so they can take all of the credit, or fail and help guide them back toward excellence,” he said.

Every year, three students also have the opportunity to be selected to present their project at the American Society of Engineering-South Eastern Conference competition, and during the Spring 2012 conference they won third place for the poster prize. This year, a team of six Creative Inquiry students participated in the poster competition for the same conference, and presented their poster titled “Design of Low-Cost Autonomous 3-D Printer Vending Machines” at Mercer University in Macon, Georgia.

Upon finishing the Creative Inquiry, students will be able to explain fused deposition modeling and describe the printing process. Fused Deposition Modeling describes a relatively low-cost additive manufacturing method that melts a polymer and deposits it in a controlled location. The process is similar to the extrusion of a hot-glue gun melting beads of glue. A stepper motor forces the polymer filament into a melt chamber and then through a nozzle at a controlled temperature. The process requires a 3-D model file of the part that is divided into horizontal layers of thickness between 100 and 300 microns. The nozzle moves horizontally and extrudes the polymer material one layer at a time until the three-dimensional model is created.

Students on the project are required to constantly stay connected and work towards common team objectives. “We will have a more specialized skillset working with 3-D printers as far as manufacturing goes, but a lot
of us are learning skills from working with a team,” sophomore mechanical engineering major Curtis Beck said.

The Creative Inquiry allows students to not only reinforce knowledge learned in class, but also learn completely new information. The greatest challenge facing the students is working with technology that is rapidly evolving. Even with supplies that are only two years old, the 3-D printing technology is changing so quickly that it is hard for students to keep up with the newest innovations.

Though this Creative Inquiry is offered through mechanical engineering, students from other majors are needed before they can fully realize the 3-D printing vending machine. Mechanical engineering students who enroll in a total of seven credit hours have the opportunity to receive technical elective credit.

Schweisinger is recruiting accounting and marketing majors to help determine what students would like to create and how much it would be worth.

“What appeals to me are projects that are able to go beyond a single discipline.”
Solar energy has become a major player in the field of renewable energy, and efforts are underway around the world to improve the output of solar panels. Most commercial solar panels are made of silicon, but organic photovoltaic cells (OPVs)—solar cells made mostly of carbon—also exist. OPVs are more malleable than their crystalline silicon counterparts, and can be printed out of any inkjet printer, making them ideal candidates for research.

A key issue when considering an energy source is how much energy is generated versus how much is output as electric current. OPVs lose about two-thirds of the energy they generate because of the structure of the organic molecules used to make the cells. A Creative Inquiry team at Clemson, led by Dr. Andrew Tennyson and Dr. Rhett Smith in the Department of Chemistry, is working to reduce the amount of energy lost in OPVs and boost their output.

“There’s been some work that’s been similar to what we are trying to do, but what we are working on has never been attempted before: synthesizing completely new materials to increase the efficiency of solar cells,” junior Alex Gay, a materials science and engineering major, said. Gay joined the project in the fall of 2013 and has been working to synthesize the material that will be used to increase OPV output.

When light strikes an OPV, it heats the molecules in that cell, causing electrons to break off to be conducted elsewhere. These electrons are still in close proximity to the original molecule after they break off, and are often pulled back, meaning they do not go on to the electrical circuit connected to the OPV. The team is working with ferromagnetic molecules (molecules that can change polarity) to move these leaving electrons along. By changing polarity, this material attracts the loose electrons away from their original molecules and then pushes them into the output electric current.

The team has been working on placing a one-to-two-molecule-thick layer of ferromagnetic material over OPVs. This material is difficult to place and keep
in the correct position, thus the team must develop techniques to do this efficiently.

“Science is more fun when it works, but the failures are helpful,” Gay said. “I’ve always just done theoretical applications in class, but in the lab it’s, ‘This didn’t work, let’s figure out why.’ You have to investigate the chemistry of each element that’s coming into it and see what’s going on.”

Tennyson plans to continue offering this project to students until an efficient OPV is created. Over the next year, the team plans to document their findings in chemistry and materials sciences research journals. In time, their design may make way for OPVs to become major contenders in the search for renewable energy sources.

“This project is a pretty good example of one of those relatively low-hanging fruits,” Tennyson said. “I was nervous when I was looking into the background reading, and I saw nobody had ever attempted this before, and I thought, ‘I’m not that clever. There’s no way I’m that clever. There must be some grand, fundamental reason why it doesn’t work.’ But it’s working, and we’re on the cusp of churning out the materials that we’re working toward.”
In the Mediterranean seaport city of Genoa, Italy, one of the more noticeable differences between American and Italian culture is found not in the pesto, but instead, in the classroom.

In Spring 2013, when associate professor of Architecture Dan Harding introduced the Reggio Emilia Approach to architecture students in his Creative Inquiry, POP-UP Ateliers: Participatory Environments for Exploring Creativity, Learning, and the Importance of Collaboration, they knew that it was something very special. The Reggio Emilia way of learning centers around the belief that people form their own personalities during early years of development and thus benefit from open-ended exploration and discovery within a supportive environment. Harding and his students wanted to see if this educational philosophy could help to better communicate some of the more complex concepts found in architecture such as structure, aperture, threshold, perspective, surface, circulation and unit—and thus, their POP-UP Ateliers project was born.

The word “atelier” is derived from the French word meaning “workshop” or “studio.” Clemson’s College of Architecture, Art & Humanities uses the term to describe the atmosphere and attitude towards the installation and development of public art on campus. Art at Clemson is not only about appearance, but also about impression, and many of Harding’s students believe that the creation of POP-UP Ateliers is more about the process than the final product.

These exhibits, which are composed of many cut and folded paper miniature models, were displayed in children’s museums in South Carolina and in Genoa, Italy. But Harding’s students did not make the models—it was children doing the folding, a process that began when the team studied abroad in Genoa, at Clemson’s Charles E. Daniel Center for Architecture and Urban Studies.

“Basically Reggio Emilia is a self-guided learning environment. The kids will go into this studio-based workshop, and won’t necessarily teach themselves, but will be guided by experience to learn in a different way.
The American Institute of Architects recognized POP-UP Ateliers with the 2014 Component Excellence Award for Public Affairs and Communication, "for heightening public awareness that an appreciation of the power of design can begin with children."

rather than listening to a teacher all day," Lillian Jones, an architecture major, said. “There’s lots of hands-on activities such as cutting and folding—and that’s where the paper came in for our project—the idea of making things with your hands."

The task, however, was no easy feat.

“Our project description was to teach these kids a concept of architecture without explicitly saying it. So we had to create a space where the kids could experience through play,” Nathalie Mansueti, an architecture major, said. “We each developed our own concept and through our original folding method we created that exhibit and space.”

Architecture major Clair Dias believes that the language barrier in a workshop with children in Genoa helped them to implement the Reggio Emilia Approach.

“At times the kids learned was really when they just did it themselves, which goes back to the Reggio approach,” Courtney Smith, a landscape architecture major, said. “You can sit there and just play until you figure out what you’re trying to achieve.”

The children also expressed their confusion—which architecture majors Dias and Brandon Richard agree was very constructive feedback.

“Children are really honest critics,” Dias laughed. “People in architecture have their own language, and an important part of this project was how to remember how to talk in normal ‘people talk.’” “For me it was the first time I got a true critique. It’s a perfect example of how your design can speak for itself,” Richard said.

“I think one of the big lessons for me at least and probably everyone else is simplification. You can make a design as grand and as complex as you want it to be, but if you want someone to understand it you have to simplify it,” Dias said. “Your design is universal. You can’t let it rest on your own personal explanations of it.”

Overall, Harding’s team hopes that projects like these will pave the way for more engaged learning in the classroom.

“Kids are the future and we need to be focusing more on them,” Jones said. “They’re the ones that are going to be designing our buildings one day.”
Each day we see endless commercials about protecting teeth; from brushing three times a day to cutting back on acidic foods to whitening them, we sometimes seem to be obsessed with teeth.

The Dental Cells for Regeneration Creative Inquiry attracts students who share a common goal: to learn more about the properties of teeth and dental cells in order to use them for restorative and regenerative means.

The project is guided by Dr. Delphine Dean and Dr. Marian “Molly” Kennedy, associate professors in the Department of Bioengineering and the Department of Materials Science and Engineering, respectively. Students come from these fields of study and from Public Health Science.

Their research involves some unusual field expeditions to obtain teeth needed to run experiments. Students visit a meat processing facility in Seneca, South Carolina, to obtain a pig’s head or jaw from which they extract teeth, and Great Oaks Dental in Pickens, South Carolina to retrieve extracted human teeth graciously provided to them by Dr. Ellen Thrailkill, DMD.

These expeditions build budding relationships outside of the lab and give students the opportunity to literally take hold of their research from beginning.

The Creative Inquiry project has three teams, each working on a different aspect of the research.

The Dental Pulp Stem Cell Differentiation team examines stem cells from pigs’ teeth to determine the impact of environmental factors on how the stem cells mature. They expose stem cells to various chemical cues to see what will help them differentiate into cells that produce dentin – the calcified main material in teeth. These dentin producing cells, known as odontoblasts, may one day be used to help patients regenerate parts of their teeth that have been damaged by cavities or injuries, or even to regenerate an entire tooth that has been lost.

A recent Bioengineering graduate and Creative Inquiry team member, Kevin Shores, said, "Personally, this Creative Inquiry has helped me tremendously because it has exposed me to the field of regenerative medicine and, specifically, stem cell research."

The second team, Wafer Cleaning Methods, also uses stem cells from pigs' teeth. The students plate cells on gold-coated silicon wafers which act as scaffolds to support the cells as they grow, divide, and form tissues. This is the basis for tissue engineering and tissue regeneration.
“This Creative Inquiry not only has opened my eyes to the research side of bioengineering, but it has also given me new direction on what I want to do when I graduate. I can confidently say I'm obsessed with teeth and want to go to Dental School,” Brian Kirkland, a bioengineering senior and 2-year veteran of the team, said.

The problem is, there is currently no standard for cleaning the wafers. Thus, the team is investigating different cleaning methods to determine their effects on surface roughness and cellular residue, and how these factors impact dental pulp stem cell morphology (shape) and growth.

In addition to their laboratory research, team members keep up with the work of other research groups throughout the United States and globally; each Creative Inquiry team member presents a review of at least one research article each semester.

Whether they are growing stem cells or scouring the state for teeth, these students wear big smiles while dedicating their time and efforts to advancing research on dental cells and regeneration.
Medical imaging technology is always pushing for greater precision, and the Creative Inquiry project, Biosensors for Medical Imaging, is taking the next step in this field. This team, led by Dr. Rhett Smith and Dr. Andrew Tennyson of the Department of Chemistry, is researching the use of dyes to mark areas within the human body affected by different ailments.

This research is part of a project funded by a National Science Foundation grant to investigate new techniques for creating molecules that work with medical imaging technologies. Medical imaging could then single these molecules out to more accurately display the afflicted areas. For example, these molecules can better target reperfusion areas—oxygen-depleted regions in the brains of stroke victims.

“We have to worry about, in these applications, how well the target [area] is transferred through material sources,” Smith said. “If you have an amorphous, disordered array of polymers, then those do not conduct charge as easily as if they were ordered in certain structures.”

“We have to worry about, in these applications, how well the target is transferred through material sources,” Smith said. “If you have an amorphous, disordered array of polymers, then those do not conduct charge as easily as if they were ordered in certain structures.”

Sophomore biological sciences major Rachel Perry spent the semester replacing some of the molecules in the polymer that was previously developed with colored molecules.
“I became really interested in this because I'm interested in going to medical school and being a physician one day,” Perry said. “I'm interested in the ways that we can incorporate science to help with further testing because the medical industry is continuously evolving and to detect different diseases such as cancer, or to detect anthrax in the presence of other things, we're always looking for the newest thing to better diagnose and treat our patients.”

While Perry's work mostly focuses on detecting sites of the body affected by anthrax, the Creative Inquiry includes several other teams working with other biosensors.

The stroke biosensors team published an article in *Organic & Biomolecular Chemistry*, coauthored by Tennyson and Smith, and students Brynna Laughlin, Tyler Duniho, Samantha El Homsi and Benjamin Levy. The article described the chemical properties of two possible biosensor substances. The teams plan to continue publishing their findings as more discoveries are made in future years.

“Our project is designed to go for several years,” Smith said. “That's why all of the students on these projects are probably sophomores; so they have at least two years to work on the project. Now we're prepared to keep doing this year after year, and by the time we're done, we'll have a broad-spectrum picture of which biological analytes interact with which polymers and which dyes.”

There is a bright future for this type of research and in moving forward, “I'm interested in the ways that we can incorporate science to help with further testing because the medical industry is continuously evolving and to detect different diseases such as cancer, or to detect anthrax in the presence of other things,” Perry said. “We're always looking for the newest thing to better diagnose and treat our patients. And so I was very interested in this because this could be the future of what I'll actually do in practice someday.”
At the Clemson Elementary School after-school care program, nearly 60 children ages 4 - 8 learn how to read alongside 18 - 22 year old college students. Instead of playing outside or coloring, the kids open new books and begin to read with their much older tutors. Impressive, right?

America Reads is a Federal work-study program that was created in 1997, after President Clinton proposed that college students serve as reading tutors to help all children read well by the end of third grade. Since 2011, two Creative Inquiry projects have been dedicated to the American Reads program.

The mission of co-directors Deanna Ramey and Anastasia Homer is to make America Reads more accessible to all college students who wish to be involved – not just Federal work-study students – and to revitalize the program by conducting experimental research.

“There’s no overarching curriculum for every school involved with America Reads. Every school is different,” Ramey said. The idea for the Creative Inquiry started when Ramey was flooded with emails and phone calls from students asking how they could volunteer or somehow be involved.

“There was no way for people to participate unless they were eligible for Federal work-study, and I felt like it was a real shame,” Ramey said. With 50-70 children selected for the program each year, the more helping hands the better, especially those with diverse backgrounds like Homer.

Teachers, parents, or after-school care directors recommend students for America Reads. Most of these students are currently struggling in reading, or may need a mentor. Ramey and Homer both stress the importance of a positive relationship between the tutor and student—to motivate children who may need more guidance in their education.

“America Reads is important because there are services for struggling kids such as Reading Recovery, but that still leaves a lot of kids without that extra push that might a difference in them becoming a successful reader versus a struggling reader down the road,” Ramey said. “The more kids are motivated to read, the more they read, and the more they read, the better readers they become.”

Homer explained, “For me it’s all about the connections the students make with their mentor. When you
see the kids running down the hall and hugging their tutors and liking to read books and bringing books to sessions saying ‘Oh I found this book. Let’s read this book!’—that makes this opportunity really special.”

America Reads student coordinator and sophomore sociology major, Jordyn Hughes, loves seeing the change she’s helped make in a child’s attitude about learning “I like seeing the kids improve and get happy when they accomplish something they’ve been struggling with,” she said. “I’ve been with the same kid for two years now and watching him get better every time really makes me feel great.”

Ramey, Homer, and the American Reads team are also working to improve America Reads by studying the young readers. “Creative Inquiry has really helped us think more about it from a research perspective” Ramey said.

Research topics have included: children’s attitudes and interests regarding informational (non-fiction) and narrative (fiction) text; parent and child attitudes towards required reading logs; and ways to improve the lesson plan used to organize every America Reads session. There’s an old saying that says that from kindergarten to third grade you’re learning to read, and from then on you’re reading to learn—and you need to be reading to learn from a much younger age.” Ramsey said. A study that the team conducted showed that when the kids were asked to name their favorite book, 31 out of 33 named a narrative (fictional) book. However, when children were presented with a selection of books that were half-informational/half-narrative, the students’ selections were even. Ramsey believes that experiments such as these are significant because they show what keeps the kids motivated and interested in learning to read.

The children are not the only ones who benefit; some of the Clemson Creative Inquiry students who are not education majors, such as Hughes, have discovered their own passions for teaching. In fact, tutors from diverse backgrounds sometimes make the best mentors.

Although the program changes and grows each year, America Reads and its Clemson supporters are here to stay.
The Institute of International Education recognized the Clemson Engineers for Developing Countries (CEDC) Haiti Creative Inquiry teams with the 2014 Andrew Heiskell Award for Innovation in International Education. The award promotes and honors the most outstanding initiatives in international higher education. CEDC Creative Inquiry teams now involve approximately 100 students per semester (freshman through graduate levels) from 30 different majors, working on 15 separate projects in engineering, economic development, and education, all focused on a sustainable future for Cange, Haiti. Read more on pages 34-35 in Decipher 2012.

The American Institute of Architects recognized the POP-UP Ateliers CI project with the 2014 Component Excellence Award for Public Affairs and Communication, “for heightening public awareness that an appreciation of the power of design can begin with children.” Working with architecture students and children in Genoa, Italy, and South Carolina Children’s Museum, the project created interactive workshops that innovated a unique learning approach that gave children and their parents access to the magic of design and the joy of giving shape to their dreams. Story on pages 51-52.
The Ruminant Anatomy Creative Inquiry Team published a textbook, *Ruminant Anatomy – A Photo Atlas*. Clemson students dissected animals, made microscope slides, photographed organs, made drawings, and assembled it all into a color atlas that will be used to provide accurate and up-to-date ruminant information to animal and veterinary programs nationwide.

Read more: http://clemson.edu/ci/spotlight/66

Creative Inquiry team led by bioengineering senior, Tyler Ovington, was awarded $10,000 for the “Cure It” Lemelson-MIT prize. The team is developing GlucoSense, a low-cost glucometer and strip system for diabetics in resource-poor settings. Team members include Alex Devon and Kayla Gainey – Kayla is now a graduate student mentor to the team she joined as an undergraduate student. Dr. Delphine Dean and Dr. John Desjardins mentor the team.

Read more: http://web.mit.edu/invent/n-pressreleases/n-press-14CIUI.html
The Phil and Mary Bradley Award for Mentoring in Creative Inquiry

The Phil and Mary Bradley Award for Mentoring in Creative Inquiry is presented each spring in recognition of outstanding work with undergraduate students. Nominations are accepted from student participants in Creative Inquiry Initiative team projects. The award is made possible by a generous gift from Phil and Mary Bradley, and consists of a plaque and a salary supplement.

Bradley Award Recipients

2014  Dr. Heather Walker Dunn, Research Assistant Professor, Animal and Veterinary Sciences
2013  Dr. Marian (Molly) Kennedy, Associate Professor, Materials Science and Engineering
2012  Dr. John DesJardins, Assistant Professor, Bioengineering
2011  Dr. Delphine Dean, Assistant Professor, Bioengineering
2010  Dr. June Pilcher, Alumni Distinguished Professor, Psychology
2009  Dr. Karen Kemper, Associate Professor, Public Health Sciences
2008  Dr. Susanna Ashton, Professor, English
2007  Dr. Mark Charney, Professor, Performing Arts

The Bradleys are a “One Clemson” family, supporting both athletics and academics, including providing the first major gift for the Creative Inquiry initiative. They did so because they like the idea of relevance and results. “The projects we’ve seen so far are about real problems,” says Phil, “and they’re designed to find solutions.”

Phil’s father, William F., had attended Clemson in the late 1930s, gone into service before he graduated, gotten married and started a family. In the late 1940s, he came back to Clemson with his young family to finish his degree. Years later, Phil Bradley enrolled in Clemson. After his sophomore year, he married his high school sweetheart, Mary, and before he graduated in 1965, they too had begun their own family with daughter, Renee.

After military service, the Bradleys settled in Charleston where they had their second child, Philip, and where Phil established a successful career in the insurance industry. Their children grew up coming to Clemson ball games. One of Philip’s first Death Valley memories is that of being picked up by the Tiger.

Both children attended Clemson. Renee later transferred to the College of Charleston, while Philip earned a political science degree at Clemson in 1992. He now has his own Allstate agency in Mount Pleasant. Seeing Philip graduate was coming full circle for Phil and Mary. In fact, Philip had his father’s and grandfather’s graduation years engraved inside his own Clemson ring.

The Bradley family has always believed in a life of involvement - whether it’s working for their church, hosting Clemson Lowcountry events or giving financial assistance to worthy causes.

“Clemson has played a large role in my family’s development,” says Philip. “As our own history has evolved, so has the University’s. Giving back is part of our shared tradition.”

Excerpted from: Clemson World, Summer 2006 Volume 59 Number 3: ‘One Clemson’ Family
Dr. Doris R. "Dori" Helms Creative Inquiry and Innovation Endowment

She’s been called a teacher, a mentor, an idea machine, and an inspiration. Dr. Dori Helms is all of that and more. Having served Clemson for 40 years, the last 13 as provost, the recently retired Helms has made a profound impact on the university – challenging students, earning the respect of her colleagues and working to transform Clemson into a nationally ranked research university.

“Almost every good idea we’ve had over the past decade to improve Clemson as an academic institution has come from the creative mind of Dori Helms,” noted President Emeritus James F. Barker in his final convocation address.

To continue her legacy, Clemson has established the Doris R. Helms Endowment for Creative Inquiry and Innovation.

The endowment will benefit student and faculty teams generating ideas and solving problems through Creative Inquiry and will support Clemson centers for innovation, such as the Watt Family Innovation Center.

Consider making a gift today.

Donors can contribute online at https://cualumni.clemson.edu/give/helms or send checks payable to Clemson Fund to: Clemson Fund, PO Box 1889, Clemson, SC 29633. Note that the check is for the Helms Endowment.

Sponsor a Creative Inquiry Project

Do you have an idea that will challenge undergraduate students? Does your business or industry have a project that would benefit from the creative minds of Clemson students?

Your business or industry can sponsor the work of a Creative Inquiry team. Contact the Creative Inquiry office with your ideas for a project: clemson.edu/ci/sponsor
Creative Inquiry gives Clemson undergraduate students opportunities to engage in research projects that span disciplines and multiple semesters. Students work in teams guided by faculty mentors, take ownership of their projects and take the risks necessary to solve problems. In the process, students hone their critical-thinking, problem solving and communications skills.

By striking a balance between creative autonomy and experienced leadership, Creative Inquiry students venture into uncharted territory to seek answers to challenging questions.