EXPLORING THE WORLD OF RESEARCH

One of the formative experiences of an undergraduate education occurs through participation in research, scholarly activity and creative work. This is where students get to go beyond the simple acquisition of knowledge and explore how to construct the future. It’s where students contribute their own emerging expertise while growing as thinkers and problem-solvers.

This report showcases some of the exciting work in which our undergraduates are engaged. They are exploring ideas that matter in many different fields. They’re also practicing inquisitiveness, building self-confidence and cultivating an appreciation for teamwork. Research asks students to organize their thoughts and explore them with depth and focus. Many undergraduates realize for the first time that their disciplines are not static, but are constantly evolving. That’s an exciting revelation that allows students to picture themselves contributing to a body of knowledge.

Undergraduate research opportunities — facilitated by faculty and staff at the leading edge of their fields — distinguish our leading, national research university. Other institutions simply don’t deliver this caliber of experience for so many students. At UI, mentorship from faculty experts can be incredibly rewarding. Our research-involved students enrich the learning of others, bring fresh perspectives and ask interesting questions that can provoke new insight.

My first contact with the world of research was as an undergraduate, working as a dishwasher in a research lab. I didn’t make much money, but the experience was priceless. It demystified science for me, taught me that professors were interested and excited to work with undergraduates, and led me to find my own opportunities in research. At a comprehensive university like ours, the opportunities to get involved are nearly endless. Get involved, and see what you’ll discover.

Chuck Staben
President
For AnaSofia Villanueva, researching a scene from José Rivera’s play “References to Salvador Dali Make Me Hot” inspired interesting connections. The play’s rhythmic language and reoccurring Puerto Rican elements, for example, encouraged her to study the movement of the moon — and compare it to a lively rumba. Such connections are crucial to her work as a stage director.

Villanueva is a 30-year-old theater arts major in the University of Idaho College of Letters, Arts and Social Sciences. A senior from Portland, Oregon, she recently directed a scene from Rivera’s play as part of the Society of Stage Directors Directing Initiative. The event is a regional competition put on by the Kennedy Center American College Theater Festival (KCACTF), a national theater program. Villanueva’s stage production won in her region, making her a national finalist in the competition. As a result, she earned a trip to Washington, D.C., for the KCACTF National Festival in mid-April 2016. She says she’s incredibly pleased to continue her work on producing Rivera’s play.

“‘References to Salvador Dali Make Me Hot’ is by far my dream production,” Villanueva says. “It’s got beauty and dance and spirits, but it also has this wonderful juxtaposition of life’s stark realism, stark brutality. It’s such an incredible message.”

In order to prepare for the scene, Villanueva used the script to create a timeline. With it, she follows the lives of the characters while collecting context clues that establish the historical, political, economic and religious dimensions of the play.

“This is a process that often starts six months before rehearsal because it’s incredibly research-based,” she says. “Some of the best learning I’ve done, especially in terms of history, starts with a single play.”

Villanueva’s research covered a range of intriguing topics. One path found her studying the economy of Puerto Rico from the 1970s through the 1990s, while another lead her back to one of her biggest sources of inspiration: the 1981 film “Zoot Suit.”

“The spirit in the film, El Pachuco, was masculine but graceful,” she says. “That was part of the inspiration for the essence and movement of the moon.”

Villanueva’s dedication to research has presented her with many opportunities. The KCACTF National Festival in particular offers master classes, connections and high-quality productions. At the end of the day, however, Villanueva says that what she loves about theater and directing is being able to utilize a revolutionary art form while collaborating with others to present beautiful, powerful messages.

“No matter what, I need to be doing shows that I am passionate about,” she says. “The things that you have joy in are the things that really make a difference.”
Where there’s Smoke, there’s Fire Ecologists

When Leslie Fowler visited the Disney Wilderness Preserve in Central Florida, she wasn’t there for the sight-seeing. She was there to burn it.

“Fire’s my passion,” says Fowler, a University of Idaho senior double major in fire ecology and management as well as ecology and conservation biology. “It’s the thing that interests me most.”

The 22-year-old from Burley, Idaho, spent her 2016 spring break at the Disney Wilderness Preserve as part of a 10-person team sponsored by the UI College of Natural Resources. The students earned two college credits doing prescribed burning for The Nature Conservancy, which maintains the preserve. The prescribed burning was done to ensure that years of fuel buildup don’t become a catastrophic wildfire.

“We’re burning to meet ecological objectives,” Fowler says. “On the Disney Preserve in particular, they have a lot of endangered species, like the gopher tortoise. We need to burn to make that habitat suitable for them.”

In addition to experiencing the benefits of prescribed burning first-hand, Fowler has found leadership and training opportunities during her time studying fire ecology. She is particularly involved with the Association for Fire Ecology and is even national president of its student branch.

And on top of it all, Fowler is a wildland firefighter.


Luckily for Fowler, hands-on learning is a crucial aspect to fire ecology research. She is currently the undergraduate research intern on an interdisciplinary team conducting an exploratory study of the acoustics of wildland fire.

“We’re thinking that maybe we can predict fire behavior or infer from the sounds that the fire’s making what vegetation is burning,” she says. “We’re just working with little seedlings right now. They’re like 3 years old, and it’s very basic. But, you know, you have to start somewhere. Who knows what we could do with it in the future?”

In addition to her team projects, Fowler’s personal research involves studying how soil is affected by a surface fire when various amounts of fuel and soil moisture are involved.

“Soil’s not a really good conductor of heat,” she says. “So I thought it would be cool to see the dampering effect that moisture has.”

Fowler says her research is driven in part by a desire to bridge the gap between fire management and science.

“A lot of things in fire ecology right now aren’t very quantifiable,” she says. “That’s why my research question is so unique. I’m quantifying the fuel on top with fire radiative energy and then I’m looking at the soil heating.”

Fowler plans on pursuing a master’s degree. She knows that wherever she goes, her future will always involve fire.

“That’s the cool thing,” she says. “In fire ecology, I found my people.”
A

fter an intense fire season swept over the Pacific Northwest last summer, a team of University of Idaho students got the chance to market and promote a computer simulation that helps people understand how to protect themselves and their homes from wildfires.

Harsh Patel, 21, came to UI from Eagle, Idaho. He is currently the group leader for marketing the simulation, Secure the Shelter, which was designed by UI faculty. The group received a $5,000 grant and works through Vandal Solutions, a student-run business that allows College of Business and Economics students to gain real-world experience by using the skills they’ve learned in class.

Patel, a senior finance major, said his group practices marketing the product to different crowds.

Wildfires destroyed nearly 7.1 million acres of land in the western United States by mid-August in 2015. It was the earliest so many acres had burned in the United States in over 20 years, the National Inter-agency Coordination Center reported. This large fire season created a great opportunity to inform the public about what to do to protect homes and people from fires, Patel says.

“North Idaho was the perfect place to start a simulation like this,” he says.

The simulation uses Samsung Oculus Rift glasses, which cover users’ eyes and transport them into a virtual world. Inside Secure the Shelter, viewers are given different tasks. The simulation is broken down into four phases: fireproof the house, pack a grab bag, remove hazardous materials in the area and, finally, wait as the wildfire approaches. If the previous tasks were performed perfectly, the house will survive the fire.

Because Patel and his team have used the 3-D goggles so many times, getting the simulation done now is like clockwork. It isn’t as easy for newbies, though.

“Seeing people use it from the outside is really funny,” he says.

Less humorous are the challenges the team has faced along the way. Earlier this spring, Patel and his team went to the North 40 store in Lewiston to promote Secure the Shelter. While there, they realized people thought they were trying to sell a product instead of promoting something that is actually going to be free.

The biggest issue they have encountered is the generation gap. The simulation is easier for younger generations to use because they are more accustomed to using an Xbox controller, which controls the avatar inside the simulation. Patel explains that it’s a struggle for older people to use and connect with the simulation.

Feedback plays a large role in what Patel’s group does. Patel has learned that while younger users are interested in using the Oculus Rift glasses, they don’t care about fire safety as much. Some older users struggle with using the 3-D technology, but they are interested in learning more about wildfire safety.

“We need to be able to find the balance when marketing,” he said.

Being the Secure the Shelter team leader comes with a lot of responsibility. One night, Patel received a phone call from an accounting professor, asking for a website to be created by the next morning. He stayed up late designing one from the ground up.

“It’s been a unique experience,” he says. “It’s been a roller coaster, but I’ve learned a lot from the experience.”
Phillip Kearns is designing technology that could one day help people with prosthetics control their devices with their thoughts.

Kearns, a 21-year-old University of Idaho student from Lake Oswego, Oregon, is a junior double majoring in electrical engineering in the College of Engineering and physics in the College of Science.

Kearns began his research during a summer 2015 internship at Intel in Hillsboro, Oregon, with his mentor, prototyping developer Andrew Lamkin. His goal was to use a computing system to receive brainwave signals from an electroencephalogram (EEG) biosensor to control other devices such as a digital camera.

The system Kearns is creating is an example of biosignal acquisition technology, which uses the body’s electrical impulses to trigger devices. Kearns’ system uses brainwave signals to control a camera, asking it to take pictures, videos or time-lapse videos of anything the user is looking at. The system can also be activated with changes in the user’s heart rate or with hand motions.

“The end goal was to demonstrate a proof-of-concept that utilized wearable computing, biosignal acquisition technology, and signal analysis in order to provide an intuitive, innovative and hands-free way to control a camera,” Kearns says.

The device is no larger than a 50-cent piece and can be worn like a watch. When users first wear the device, the EEG can log and graph their mental and physical statuses over time, allowing users to adjust the sensitivity levels that trigger the device. Once that step has been performed, the controller can be activated in a number of ways: through specific types of brainwaves sensed by the controller, through hand motions sensed by the accelerometer on the device, or through the increasing heart rate signals transmitted from a remote heart-rate monitor.

Kearns’ project also demonstrated that the device has the ability to be used with prosthetics. Near the end of his internship, Kearns and his mentor worked with a pair of high school students. The students had made a 3-D printed prosthetic hand, and Kearns connected the hand to a small electric motor and his EEG device, allowing wearers to use their brainwaves to tighten the strings on the fingers of the hand in the same way that our own tendons are used to grip objects.

Kearns hopes that one day his device will not only be used in the medical field, but also in everyday usage, such as being able to control the lighting in homes based on people’s emotions, or used by pilots or drivers to operate vehicle electronics without taking their hands off the controls.

His research has been recognized on a national scale, too. This spring he was selected as an honorable mention for the prestigious Barry Goldwater Scholarship and Excellence in Education Program.
Kimberly Davenport started college at the University of Idaho sure she wanted to be a veterinarian. But one class changed her path.

Raising horses and growing up in Moscow, Idaho, Davenport always knew that she wanted to study animal science at UI, but her focus changed from veterinary medicine to animal genetics when she began studying with Brenda Murdoch, an assistant professor in the College of Agricultural and Life Sciences.

Davenport was intrigued by the idea of using genome mapping to identify and understand an animal’s genetics to improve products that come from livestock, so she approached Murdoch about becoming involved in her research project. Now the 21-year-old UI senior can’t imagine doing anything else.

“I’m really glad that I had the guts to go talk to her about it,” Davenport says. “I discovered that I liked the research side more than the actual medicine.”

In the beginning, Davenport started by predicting the genetic traits of an offspring based on the parents’ genetics, but then began to go more in depth. Now she can determine an animal’s specific genetic markers. Davenport and her colleagues decide which animals should be breeders, butchered or used for production of things like milk and wool. While Davenport and her team mostly focus on cattle and sheep, they have also genetically tested pigs, moose and goats.

This project has greatly benefited the cattle owned by the university. The research team extracted DNA from each cow and used testing to look at its genetic makeup. This allowed them to determine which cattle have better traits and will produce better offspring, live longer or make large quantities of milk, which in turn allows them to improve the quality of the herd.

Davenport has been so inspired by her professors and colleagues that she plans to continue her education after she graduates in May and get a graduate degree in animal science from UI.

“If my mentor wasn’t so great, I probably wouldn’t have considered doing research,” she says.

Davenport plans to inspire her own students someday to go above and beyond just going to class and to join a research project. She wants to be a professor, lead research projects and share her love and passion for research with others.

“I see how great and inspiring my professors are, and that’s how I want to be.”
Senior chemistry major Jacob Dalton, 23, likes to say that everyone should be a chemist. He wasn’t always so enthusiastic about chemistry, but one research project changed his mind.

During his first year at UI, Dalton, of Shelley, Idaho, considered declaring English as his major and becoming a writer, but remained unsure of what he really wanted to do with his life. While taking his general education courses, he discovered a new interest in the College of Science.

With no idea of what he would study or how to do research and with no previous research experience, Dalton approached his organic chemistry professor and asked to participate in a project. That opportunity has helped Dalton discover what he wanted to do with the rest of his life. He says he is glad that he got up the courage to take a chance and try something new.

Dalton’s involvement in undergraduate research helped him to find a passion for science and research. He loves the hands-on experience that participating in an interdisciplinary research project gives him.

“People always ask, ‘Is there a practical application for what we’re learning?’ and research can help you answer that question,” he says.

Dalton is participating in a cutting-edge interdisciplinary research project that is dedicated to discovering environmentally friendly ways to increase the chemical reactivity of clay.

Dalton and his colleagues began by modifying naturally occurring clay in the lab, and now are able to synthesize their own clay in a geology lab and modify it in a chemistry lab. By making their own clay, researchers can control and improve the different properties in the clay.

This project is distinctive in that two different disciplines are collaborating and cooperating to make new discoveries. Dalton is learning things about not only chemistry, but geology as well. He gets to use machines that are usually only used by geologists. Only a handful of researchers have even experimented with modifying clay and none of them have studied the subject as extensively as Dalton and the other researchers at UI.

“I think it’s cool that we take something that you don’t think about, like dirt or clay, and doing something useful with it,” Dalton says.

Dalton loves research so much that he decided to make a career out of it. He will be completing his undergraduate degree at UI in May 2016 and will move on to complete his doctorate at University of California, Davis.
Storytelling in a Virtual World

Virtual Technology and Design student uses high-tech tools to educate

Oscar Rodriguez has always been a storyteller. He doesn’t tell stories in a traditional way, though. As a student in the Virtual Technology and Design Program in the University of Idaho College of Art and Architecture, Rodriguez, 21, uses virtual tools, such as 3-D modeling software, Photoshop and other design technologies, to make a story come to life.

As a child, Rodriguez, who is from Jerome, Idaho, loved films and wanted to learn how he could create his own. He found his way to virtual technology and design during a visit to campus, before he became a student of the university.

“When I heard about this major, I just remember feeling like ‘Yeah, I feel like I should be here, you know? This is the place for me,’” he says.

Now, being immersed in it, he’s found that his major is full of possibilities. One of his current projects is an online game designed to educate people on the effects salmon have on the ecosystem. Another project he worked on involved augmented reality, which simulates an image in the real world on a device, like a smartphone, through a camera. Rodriguez, alongside his friend Kyle Weage, created a pop-up book that used special symbols on the pages of a physical book to activate virtual pop-ups.

“You can go into all sorts of fields from this,” Rodriguez says. “A lot of people come in because they want to make video games or they want to make animated movies, but you learn along the way that you can apply this to all sorts of things.”

Rodriguez says students in his program can apply what they’ve learned and the tools they’ve become familiar with not only to create designs, stories and games, but also to use their knowledge for more practical applications, such as medical simulations or architectural design. The need for Rodriguez’s kind of work spans different fields and has many applications — especially in a world where jobs are changing as technology changes the world.

“Our professor has said before that they’re kind of preparing us for jobs that don’t exist yet,” Rodriguez says. “We’re sort of a special breed.”

Not only is his work widely applicable, it has a lot to teach him, too.

“I learned how to tell a story, how to design and how to think,” he says. “I’ve also been able to learn a lot about art as well, and I’ve been able to get better at painting and drawing. Everyone has different skill sets; some people are really good at modeling, others at animating — it’s kind of a wide range of things.”

His work is also designed to teach others, which means he learns about topics outside his major.

“When we start a project, we’ve got to research — we have to make sure we’re up to speed with everything,” he says. “If we have a client who wants us to do something science-related, we have to research all there is to know about that subject. We’re essentially showing an audience, and if we don’t understand, they don’t understand.”

Rodriguez’s work focuses much on teaching, learning and reaching other people, and he believes the best way of doing this is telling stories.

“Humans are storytellers,” Rodriguez says. “We have to find a way to tell the story.”

WRITER: Madison Billingsley, a junior from Covington, Washington, is majoring in creative writing and minoring in computer science.

PHOTOGRAPHER: Kira Hunter, from Emmett, Idaho, is a junior majoring in biology and minoring in professional writing.
As a middle-class white woman from Boise, Emily Gehlken has never really faced discrimination. And if she hadn’t changed her major to education, she may have never thought about how others see the world.

Gehlken, 20, is a senior elementary education major in the University of Idaho College of Education. She is part of a group of UI education students who meet outside of class to discuss their observations and experiences of diversity and the way people from different backgrounds interact. Their aim is to discover how to improve relationships among all the people on campus.

“The research isn’t typical,” Gehlken says. “We aren’t testing people or gathering data. We write up our experiences and then explore them.”

Instead of creating graphs and collecting data, Gehlken says the research the students conduct is based on observations of what they felt or saw happen.

For example, Gehlken describes a hypothetical scenario where a student goes into her education class. The teacher brings up a difficult topic of conversation, but because it is an unfamiliar and uncomfortable subject, the student decides not to partake in the discussion. What Gehlken and the group are hoping to learn is why situations like this happen and how they can be changed.

Gehlken previously majored in biology. When she switched to education she encountered some negativity.

“People think education is an easy major,” she says, “but getting into the research discourse of it has been exciting.”

Gehlken’s research strongly ties into her major. It has made it immensely clear to her how important it is to help children develop an appreciation for diversity.

The biggest issue Gehlken says her group members encounter is the “common lack of engagement in diversity.” Because they have seen this time and time again, their goal is to encourage an openness to the different backgrounds people have at UI.

Diversity can be a controversial topic. Gehlken explained it is completely normal and OK to not understand where someone is coming from, but it’s important to remember that person’s feelings are still valid.

The group hopes to publish the research they have done in hopes of informing people about what they have noticed and learned throughout their daily experiences.

“I wish there was one end-all-be-all answer, but there isn’t,” Gehlken says.

She believes the first step to fixing the problem of discrimination is to educate and make people aware of the common misconceptions there are for the many diverse students and faculty on campus.

“It goes all the way back to kindergarten. We know when things are right and wrong. We just can’t be bystanders to it,” Gehlken says. “We just need to figure out how to love people better as humans.”

Dedicated to Diversity

Education student examines relationships with peers

WRITER:
Emily Lowe, from Kuna, Idaho, is a sophomore majoring in journalism.

PHOTOGRAPHER:
Madeleen Johansson is an international student from Tibro, Sweden, and is majoring in interior design.
You’re Not Just an Undergrad

Research opportunities give students a chance to apply knowledge

Many University of Idaho undergraduate students have the opportunity to participate in their own research with the help of faculty such as Peter Fuerst, a UI assistant professor in the Department of Biological Sciences in the College of Science.

Originally from Cleveland, Ohio, Fuerst has been at UI for six years. In that time, he has given undergraduate students the opportunity to conduct research projects the same way graduate students at UI do.

He believes undergraduate students belong in the research labs. Although many undergraduates are still learning the basics of their discipline, they can make important contributions to research. “They’re bright and have a lot of motivation,” Fuerst says.

Students interested in doing research might not be sure how to find opportunities, but shouldn’t be afraid to seek them out. Fuerst says the best way to get into research is for students to search for faculty members in fields they find interesting. Then it’s up to the students to show the faculty members how much they’re interested by learning about the research, finding an aspect of research they are interested in and then meeting with the professor to discuss their work.

Training students costs professors their time, but Fuerst says it’s worth it.

Currently, Fuerst and his team of six undergraduate biology and psychology majors are focusing on how to get “the adult nervous system to fix itself after it has been damaged.” The developing nervous system in embryos and infants is able to fix itself much easier than an adult’s, but Fuerst says the reason is unknown.

The students who work in Fuerst’s lab, like those working on many other research projects with UI faculty members, get there in one of three ways. First, they can volunteer: It’s a great way to gain the experience and necessary tools before partaking in an extensive research project. The university also offers research credit as a 400-level class in many fields of study. The final option is finding a research position that pays.

“If students have to pay their way through college, we still want them to be able to get the experience,” he says.

Other students receive grants for their work, whether through the Office of Undergraduate Research, other university programs or outside agencies. In Fuerst’s lab and others on campus, some students are funded by the Idaho INBRE program, which offers a summer fellowship to students across the state.

Fuerst says each of his students initially learn one lab procedure extremely well, and then begin to learn other techniques. After a couple of years, the student is then able to train new undergrad students on the subject.

“The most important thing we can teach our students is how to ask the right questions,” he says.

Many of Fuerst’s students are graduating this spring, so he is hoping to find new students to train to continue on with the research. Students might think an undergrad will only be assigned to clean dishes, but it’s much more than that.

“I want students to become more aware of their opportunities,” Fuerst says.
ABOUT VANDALS IN FOCUS

The University of Idaho offers undergraduates exceptional opportunities to engage in research, scholarly work and creative activities. Each semester, scores of students representing all disciplines at UI take advantage of these opportunities and work on faculty-mentored projects.

Through Vandals in Focus, the Office of Undergraduate Research is proud to showcase a sampling of these student projects selected from each college at UI.

I encourage current and future UI undergraduates to visit the Office of Undergraduate Research to learn more about getting involved in faculty-mentored projects. Participating in undergraduate research will enrich your academic experience and expand your horizons — get involved!

David Pfeiffer
Director, Office of Undergraduate Research

ABOUT THE OFFICE OF UNDERGRADUATE RESEARCH

The Office of Undergraduate Research (OUR) supports student engagement in out-of-class research activities in all disciplines at the University of Idaho. OUR raises the visibility of undergraduate research, facilitates opportunities and helps students showcase their work.

OUR offers grants, information sessions and guidance for undergraduates, hosts the UI Undergraduate Research Symposium and works with faculty interested in mentoring undergraduate researchers.

Learn more at www.uidaho.edu/undergradresearch

ABOUT THE VANDALS IN FOCUS TEAM

Vandals in Focus isn’t just about student projects — it is a student project. A team of 13 student writers and photographers produced the stories within, as well as online-exclusive pieces.

The Vandals in Focus team brings together students from a diversity of majors, backgrounds, experience levels and interests, whose brief biographies are included with their work.

Their experience, and the experiences of the students they interviewed and photographed, represent just a few of the possibilities for hands-on creative activity, scholarship and research at the University of Idaho.

Check it out online at www.uidaho.edu/VandalsInFocus