Momentum!

Spring 2015

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Jon Viducich, a master's student in the Water Resources Graduate Program, takes riverbed samples near a proposed sand dam site in William, Mozambique.

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Celebrating the impact of giving

People give for all kinds of reasons, such as gratitude for something they received, passion for a cause, or a desire to nourish younger generations. They give in all kinds of ways, like sharing their time, money, experience, wisdom, and inspiration. In a university setting, supporting the work of one student or scholar can literally change the world.

In this issue of *Momentum!*, our stories celebrate the impact of giving:

- In response to growing demand by engineering students to make a lasting, positive impact on the world, last year we launched one of the nation's first Humanitarian Engineering programs. Supported by generous gifts from two couples, this new discipline applies engineering solutions to a host of issues that affect local and global populations, such as agriculture, public health, and climate change.
- It may be generations before we fully comprehend the full impact of the numerous gifts Hank and Janice Schuette made to the college in their lifetimes. At the very least, their support helped move Oregon State's Department of Nuclear Engineering and Radiation Health Physics into the international spotlight when they endowed the first chair in nuclear engineering. Their final estate gifts endow another chair and four graduate fellowships and will provide support for students, faculty, facilities, and equipment in perpetuity.
- Matthew Adams' method of giving is already making a difference in his profession. Matthew is a civil engineer whose passion is helping structural engineers gain a better understanding of the materials they use in their designs. To pursue this goal, he created a program to get young professionals more involved in the American Concrete Institute. He is also earning a Ph.D. so he can continue to impact how civil engineering education is delivered.
- It is relatively common for us to hear about a late-career or retired engineer making a donation to the college late in life or including the college in an estate plan. It is less common for us to hear of an early-career engineer who is already thinking of how he can express his gratitude for his education. But Anthony Davies seems to be an uncommon young man. Only three years after earning his master's degree, Anthony wrote a check to the OSU Foundation to support the scholarship fund that made a crucial difference in his ability to graduate and begin his career. His gift will help to ensure that future students also can realize their dreams.

With these gifts and many others like them, engineering will continue to advance, and we can continue to fulfill our mission of educating tomorrow's engineering leaders. Our gratitude knows no limits.

Go Beavs!

Scott A. Ashford, Ph.D.
Kearney Professor and Dean
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PLANTING SEEDS: HUMANITARIAN ENGINEERING TAKES ROOT AT OREGON STATE

By Gregg Kleiner

When mechanical engineering professor Kendra Sharp discusses Oregon State University's newly launched Humanitarian Engineering program, she talks of seeds.

Sharp, who directs the program, points out how an initial $100,000 seed planted by donors Richard ('69 Industrial Engineering) and Gretchen ('69 Elementary Education) Evans enabled the program's first shoots to emerge from the soil this past year. She talks about the seeding of graduate students who are interested in applying engineering skills to humanitarian challenges in the developing world. And she expresses gratitude for a more recent $132,000 endowment that is helping students seed their dreams to build a better world.

Kendra Sharp meets with Helpline organizers and a faculty member from the National University of Sciences and Technology. Helpline is a nonprofit organization in Pakistan.

The fledgling program — one of only about a dozen in the United States — was launched last year. The relatively new discipline of Humanitarian Engineering applies engineering solutions to issues ranging from clean water and reliable electricity to agricultural techniques, public health, the impacts of climate change, and the ability to earn a livelihood.

At Oregon State, graduate and undergraduate students pursue coursework and research that benefit people locally and globally, with a focus on underserved or low-resource communities. The Evans gift enabled the program by providing flexible funds for graduate student fellowships and study abroad.

When alumnus Dennis Zerba ('71 Mechanical Engineering) and his wife Claudia Roenicke Zerba ('73 Elementary Education) heard about how Sharp is developing micro-hydro power plants in developing nations, they set up an endowment to nurture the new program, which taps Oregon State faculty expertise in both engineering and non-engineering disciplines.

"The program has a leadership committee of close to 20 OSU faculty, and half are not in the College of Engineering," Sharp said. "This is a very interdisciplinary effort that brings diverse perspectives to classes, workshops, and discussions, which is good for everybody, because creativity and resourcefulness are so important in a program like this, and those often come from a diverse team."

One of the unique features that sets Oregon State's Humanitarian Engineering program apart nationally is the inclusion of a Peace Corps International master's program in engineering — a program offered by only one other school west of Minnesota. This enables students to take a year of coursework on campus, perform graduate fieldwork while deployed with the Peace Corps, and earn a master's degree upon returning to the states.

Sharp is already seeing burgeoning interest in the program from current and prospective students and faculty. "We have students pounding the door down, and I get a lot of emails from students asking me about the program or wanting me to speak about it at student groups," she said. "And prospective faculty say they're impressed that we offer this."

The program has a strong appeal to women and underrepresented groups, Sharp said, including at the high school level. "I had a high school girl visit, and she told me she had no idea she could do this sort of thing with an engineering degree."

The initial gifts have enabled the program to foster what Sharp sometimes calls "rising stars."

Jon Viducich, a master's student, and Jackline Naomi of the African Sand Dam Foundation take riverbed samples near a sand dam in Kipico, Kenya.

"The funding helps us to seed and support a select group of graduate students, who then support the program's development by contributing to the curriculum and arranging talks or workshops," she said. "And these students are giving much more back than we expected, partly because they are really inclined toward, and committed to, service — to both the local and global community."

A recent Oregon State lecture series developed in part by Humanitarian Engineering students brought to campus a visual storyteller who discussed crossing cultural divides, a social entrepreneur who focused on the art of listening, and an environmental engineer, David Manz, who developed the BioSand water filter for producing potable water in almost any environment.

In addition to lectures, the speakers also offered hands-on workshops and interacted with high school students and others in the wider Corvallis community. A BioSand water filter constructed during Manz' visit is now part of a University Honors College thesis project and will be used for class laboratories.

So far, five graduate students have been awarded Evans Family Fellowships. These students are developing and installing weather stations that help African farmers, teaching math and science in Tanzania, doing fieldwork on sand dams that help address water scarcity in dryland areas, designing sustainable water projects for rural communities, and addressing climate impacts on distributed hydropower in northern Pakistan.

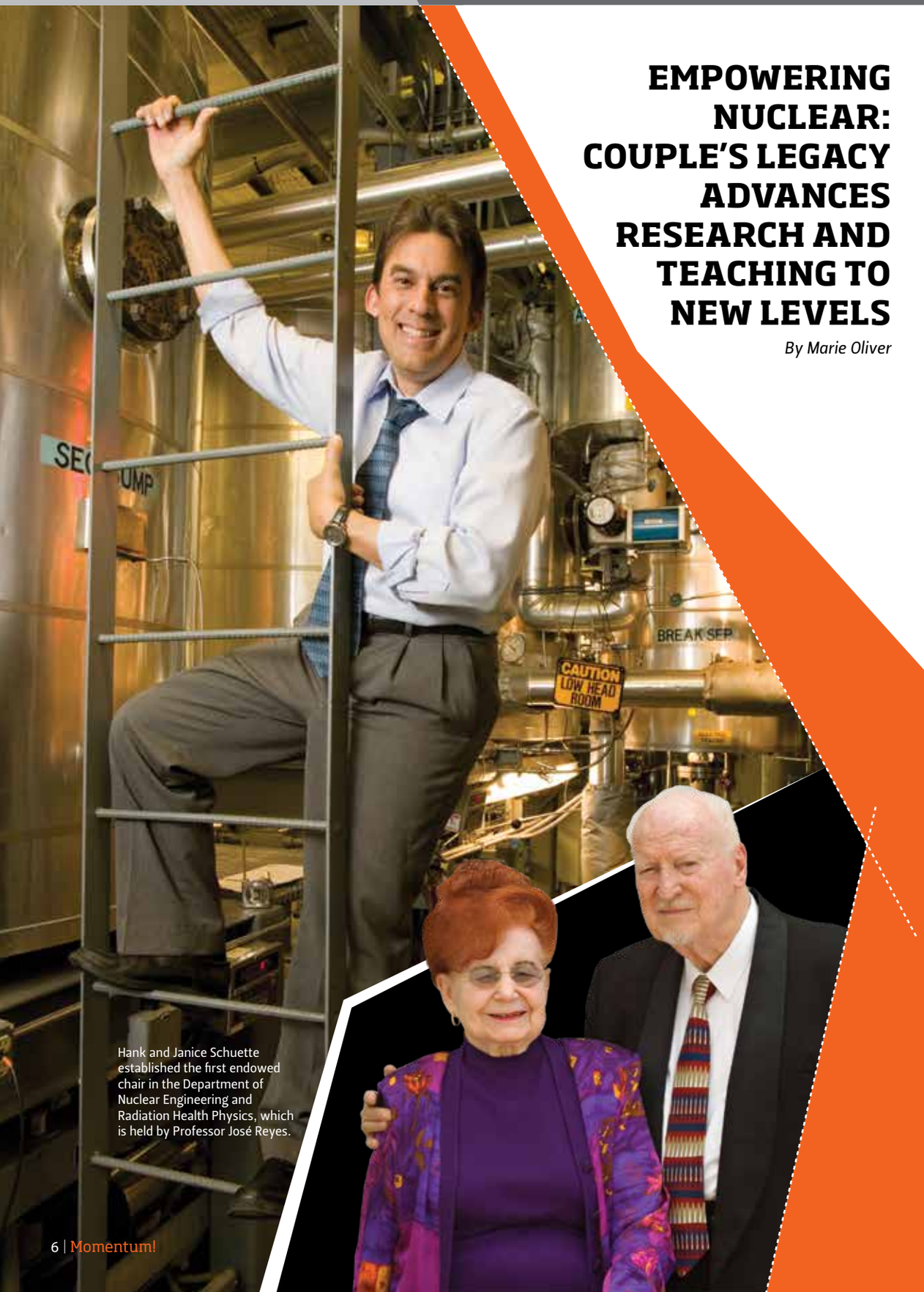
The program is not degree granting, but it will offer an undergraduate Humanitarian Engineering minor starting next academic year, in addition to a parallel Global Development Studies minor accessible to all students across campus. Graduate students can enroll in the core courses and work with Humanitarian Engineering faculty on related projects. Additional options for a graduate minor or certificate program are in the works.

The program is developing engineers with better communications skills, deeper cross-disciplinary and cross-cultural understanding, and the ability to close the gap between an engineering project and the context in which the project takes place.

"One of the things we focus on is 'engineering in context,' which means understanding the context around the design challenge you're trying to solve," Sharp said. "To be successful, you need to understand your client, whether that's a village in Kenya or a group at Intel. Understanding how to recognize, evaluate, and communicate a client's needs is a critical piece."

Sharp is passionate about Humanitarian Engineering because of the impact it can have on students, faculty, and the world.

"OSU has some phenomenal faculty doing terrific work in water, energy, community resilience, public health, and many other areas," she said. "So I believe we can build our Humanitarian Engineering program into a nationally recognized, exemplary program that spans boundaries to consider complex systems and problems... so the work we do here at OSU can have a positive impact on the world." **M!**



Hank and Janice Schuette established the first endowed chair in the Department of Nuclear Engineering and Radiation Health Physics, which is held by Professor José Reyes.

EMPOWERING NUCLEAR: COUPLE'S LEGACY ADVANCES RESEARCH AND TEACHING TO NEW LEVELS

By Marie Oliver

The nuclear industry was in its infancy when Hank Schuette ('50 Mechanical Engineering, '01 Engineering Hall of Fame) was earning a degree at Oregon State University in the late 1940s. The college didn't yet have a nuclear engineering department. If the degree had been offered, Schuette probably would have become a nuclear engineer. Instead, he and his wife Janice transformed a small Sherwood, Oregon, company into an international leader in the design, manufacture, and installation of energy systems that turn biomass into electricity.

Half a century later, Oregon State's research on passive safety systems for nuclear power plants came to the couple's attention. By then, they were in a financial position to support a technology they believed in by giving back to Hank's alma mater.

The Schuettes' considerable enthusiasm for nuclear energy and the research in progress at Oregon State led them to generously contribute to the nuclear engineering program, thrusting it into a new dimension of international visibility and influence.

Today, Oregon State's Department of Nuclear Engineering and Radiation Health Physics is ranked in the top 10 by *U.S. News & World Report*, and part of the reason it has been able to achieve that stature was a gift from the Schuettes in October 2003. Their $3 million donation, which was at that time the largest gift to the department in its history, enabled the creation of the Henry W. and Janice J. Schuette Endowed Chair in Nuclear Engineering and Radiation Health Physics. José Reyes became the first holder of the Schuette Chair.

Reyes' research is part of the reason the department is now among the best in the nation. His research contributed to the development of a small modular reactor that uses natural circulation to provide cooling. The support from the Schuettes allowed him the time to develop technology that eventually led to a major commercialized venture, NuScale Power.

"The funds from the endowment allowed me to work with the College of Engineering to commercialize our design and move it from the laboratory to the market," said Reyes.

At that time, it was news to many people around the world that nuclear power could be accessed more safely and at lower cost than previously believed. Reyes' work spawned a nuclear renaissance and brought Oregon State's program into the national and international limelight.

"Many nuclear engineering departments around the country had closed down, and the fact that someone was investing in nuclear at that point had a ripple effect across the whole country," said Reyes. "Back when the Schuettes created that endowment, no one knew about small modular reactors. Now they are featured in nuclear conferences around the world."

The increased visibility, along with other factors, spurred a new level of growth within the Department of Nuclear Engineering and Radiation Health Physics over the next decade. Since the endowed chair was established, the number of degree-seeking students in the department has more than tripled.

Reyes is on leave of absence from the university while he fulfills his role as chief technology officer for NuScale. Meanwhile, funds from the endowment are available to support other faculty and students.

The Schuettes' investment is also stimulating economic growth in three states and attracting new dollars. "We started off with myself and Paul Lorenzini ('70 Ph.D. Mechanical Engineering), and now we're approaching 600 employees," said Reyes. "We have four offices: two in Oregon, one in North Carolina and one in Washington D.C. — it's a huge team of folks. Our lead investor, Fluor, has invested over $230 million, and we've successfully competed for an additional $217 million in matching funds from the Department of Energy."

NuScale's prototype is located on campus and attracts about $1 million per year in research funds to the university.

In other words, the Schuettes' gift just keeps on giving. But that wasn't the end of the Schuette legacy — by far.

Following Hank's death in 2013, the department received an additional $4.7 million from his estate, pushing the College of Engineering over its $200 million campaign fundraising goal.

The department is using the bequest to endow a professorship, several graduate fellowships, and an unrestricted fund. Some monies have already been used to renovate the aging radiochemistry lab and make it a state-of-the-art wet lab for working with radioactive materials.

"Few universities in the United States have a radiochemistry program," said Kathryn Higley, head of the Department of Nuclear Engineering and Radiation Health Physics. "But they're essential to nuclear security and nonproliferation."

Other plans for the earnings from the unrestricted endowment include support for faculty research, undergraduate scholarships, and equipment purchases.

"An unrestricted fund is tremendously useful," said Higley. "We want to use this investment to build a lasting legacy that reflects the Schuettes' view of the importance of nuclear energy while fueling the department's growing research endeavors and the number of graduates. We're very excited about that. We compete with the best universities in the country, and to have these resources is breathtaking." **M!**

PASSING IT ON: A PROFESSIONAL LINEAGE OF TEACHING AND MENTORING

By Warren Volkmann

This April, Matthew Adams, a Ph.D. candidate in civil engineering at Oregon State, will receive the 2015 Young Member Award for Professional Achievement at the spring convention of the American Concrete Institute, one of the most influential industry organizations in civil engineering. The award recognizes recipients for spearheading programs for students and young professional members of the American Concrete Institute, and for mentoring new concrete professionals.

By accepting this award, Adams cements a professional lineage of civil engineers who make teaching and mentoring a priority. Adams' Ph.D. advisor, Jason Ideker, won the award in 2014, and Ideker's mentor, Kevin Folliard at the University of Texas at Austin, won it in 2002.

Material deficiency

Adams' selection is unusual because the award usually goes to a working engineer or prominent professor rather than a student. He had already gained professional experience before coming to Oregon State. Adams graduated from the University of New Hampshire in 2006 with a bachelor's degree in civil engineering and went to work for Kleinfelder Associates in Boston, a nationwide civil engineering and architecture firm. At Kleinfelder, he designed all kinds of structures, including water treatment plants and renovations of aging buildings. After several years on the job, he became aware of a pervasive gap in professional understanding.

"I noticed that small- and mid-sized firms didn't have materials people," Adams explained. "The firms had structural workers who were doing all the materials specifications. Final decisions were being made by people who didn't have a clear understanding of their materials. I became the Boston office's de facto materials engineer. It became a calling for me, and I realized we need to teach structural engineers more about materials, make it a more important part of the curriculum, get more useful info out in guidebooks and codes."

Adams' professional mission took him to an American Concrete Institute convention, where he first met Ideker and learned about Oregon State's emphasis on materials research.

"At the research and graduate student level, we have incredible strength in the materials area at OSU," said Ideker, Kearney faculty scholar from 2012 to 2014. "Three professors are focused on cement-based materials, and this rivals the top programs in the country. Our undergraduates don't get as much exposure to materials as I would like, but the materials faculty is doing a lot to get undergraduates involved in materials education and research."

Matthew Adams inspects a concrete prism made with sustainable recycled concrete aggregates and subjected to drying conditions.

After their initial meeting, Ideker and Adams stayed in touch, sharing their concerns about what happens when designers do not understand the long-term consequences of their material specifications.

"We design for when a building opens, not for the building in 100 years," said Adams. "A lot can happen with the concrete mixture over 100 years. Sometimes it can happen quite quickly." He points to concrete shrinkage in Oregon bridges and Oregon State's Kearney Hall, a showpiece for the College of Engineering. Kearney Hall (formerly called Apperson Hall) was renovated five years ago, but already shows cracks in the floor caused by concrete shrinkage.

Back to school

In 2010, Adams' materials mission triggered a lifestyle overhaul. He quit his job and enrolled in a graduate program at Oregon State, where Ideker had just landed a grant from the Oregon Transportation Research and Education Consortium. As Adams' advisor, Ideker put him to work researching the durability of recycled concrete.

Adams retained his membership in the American Concrete Institute, where he launched a program to get young professionals involved in the institute. "Our two main problems reaching engineers in my generation are the cost of attending national meetings, and the slow pace of change at the national level," he said. "The ACI is a consensus-based volunteer organization, so change takes time. In general, my generation wants things to work more quickly."

Adams tackled the first barrier — cost — by creating an essay contest for young professionals in which the winner receives a scholarship to attend the convention. A mentor shows the recipient around the convention and facilitates introductions to the institute's movers and shakers. Adams takes an interest in the winners, showing them how being involved at an industry level can benefit their careers.

The sharp edge of Adams' young professional spearhead was wielded inside the institute. He began a massive educational campaign to alert older members — especially committee chairpersons — about the aging of its membership and the resulting "brain drain" as members retire. To reach out to young professionals, Adams worked with others to spark a social media campaign, which was officially adopted.

Adams accomplished this while earning a master's degree in 2012 and continuing toward a Ph.D. His work is supported by a graduate fellowship from Kerneos Aluminate Technologies, which is based in France. His thesis discusses cements with a high level of alumina rather than silica. He is creating new testing methods for concrete made with the cement, which gains strength rapidly and is used to patch roadways and bridges. He and Ideker also conduct research in the Green Building Materials Laboratory, which was made possible by an initial investment from Oregon BEST.

Adams plans to complete the Ph.D. in May, but he may never return to work in industry. He hopes to remain in academia, where he can continue to perform wide-ranging research on concrete materials and teach the next generation of engineers. What began as a professional mission to improve our understanding of materials has been transformed into a career of teaching and mentoring young engineers.

"I came out here mainly to be a researcher, but I discovered that I enjoy the teaching and education side. That's the fun stuff," Adams said. **M!**

Matthew Adams examines a fresh concrete mixture to check for segregation and workability before casting specimens.

GIVING IN GRATITUDE: EARLY CAREER ENGINEER SUPPORTS SCHOLARSHIP FUND

Although Anthony Davies ('10 B.S., '11 M. Eng. Civil Engineering) is just getting started with his engineering career, he recently decided to make a contribution to the Robert Corbin and Flo Retta J. Young Memorial Scholarship fund to express his deep appreciation for the support he got for his education.

When Davies received the scholarship during his junior and senior years at Oregon State, it was not just an honor, it made a difference in his ability to graduate on time. "It was a huge help," he said. "I'm not able to contribute a lot, but I attribute being able to get a job right after college in the middle of a recession to Oregon State. It was just my way of saying thanks for the opportunity."

Flo Retta Young established the scholarship fund to recognize her husband Robert Corbin Young after he died. She wanted to honor his struggle to gain an education in the face of adversity.

Robert was raised during the Great Depression of the 1930s. His family moved often, following the available work, and Robert attended schools throughout Oregon, including a one-room schoolhouse at Wildcat in the Cascade foothills near Molalla. By the time he was a teenager, his parents were able to make a down payment on some land in the Cascade Range above Detroit.

Initially, Robert was upset about moving to Detroit because there was no high school nearby, and he desperately wanted to finish his schooling. His mother petitioned the local school board and, as a result, he was one of two students in the first graduating class of Detroit High School in 1939.

Robert went on to attend Oregon State, taking basic engineering courses. Because of the family's financial situation, his academic career was spotty. He would work at logging all summer and fall and, having saved almost enough money, enroll for winter and spring terms. He skipped one term in order to send his younger sister in his place. While in school, he supplemented his income by working nights in a hospital's kitchen.

He intended to complete his degree requirements in this fashion, but World War II intervened. He joined the U.S. Navy Construction Battalion, later named the Seabees. The Seabees were composed of highly skilled craftsmen from all trades — electricians, carpenters, plumbers, equipment operators — who supported the troops overseas by building bases and other facilities in addition to fighting when necessary. Robert served in the Aleutian Islands.

Once the war was over, Robert returned home and joined the post-war push to get the economy growing. He and another veteran bought a Caterpillar tractor with their savings from the military and began a business clearing fields for farmers, and their joint enterprise grew into a successful wood products business.

In 1950, Robert married Flo Retta, and they raised three daughters. He continued to use the principles of basic engineering he learned at Oregon State on a daily basis as he built logging roads and, later, assembled and maintained wood products processing plants.

Robert and Flo Retta always valued the importance of education, and the intention behind the fund is to provide scholarships to those students who show academic potential and whose economic circumstances are such that they are not able to pay their total college costs from personal or family resources.

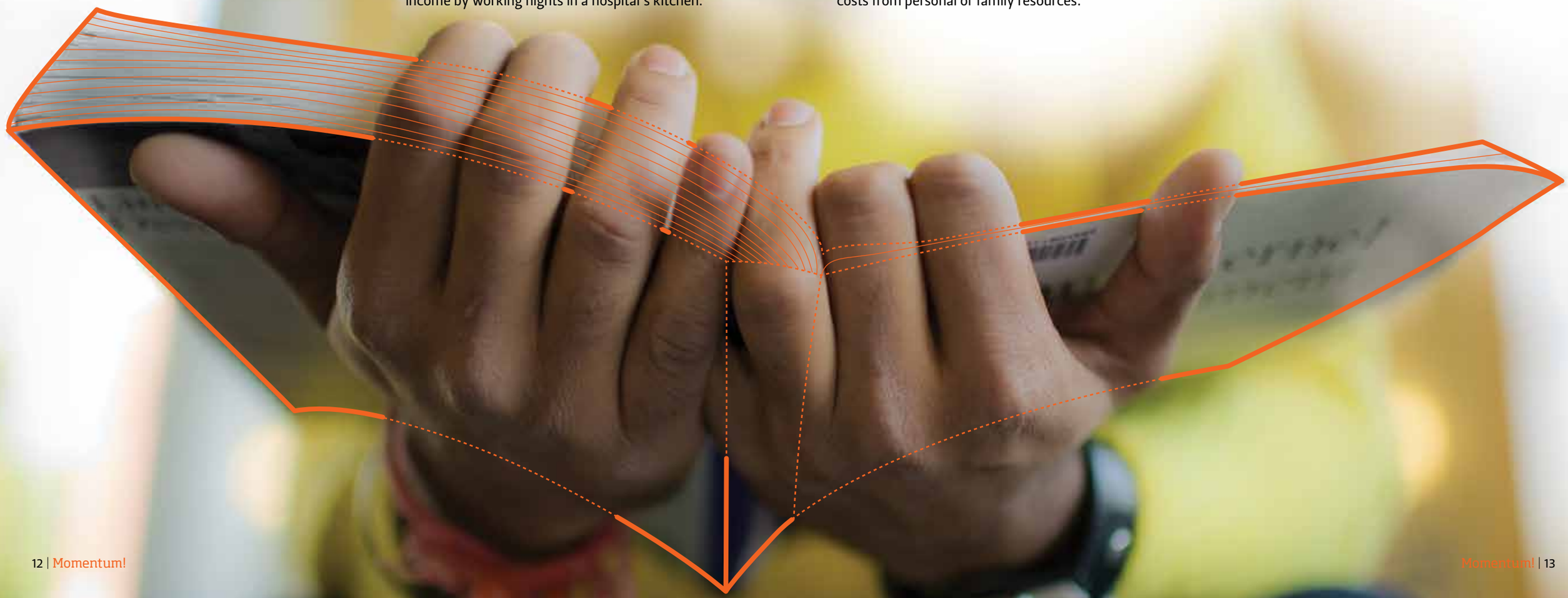
Davies, a promising student who was raised in Dallas, Oregon, matched the profile perfectly. From the time he started helping out at the family's construction business as a young teenager, he knew he wanted to be an engineer. When it came time for college, he knew he would be paying much of his own way to attend Oregon State — his dream school.

His parents contributed to tuition his freshman year, but after that, Davies had to piece it together with income from part-time work, sizeable student loans, and merit-based grants (including a Presidential Scholarship). Without the Young scholarship, it would have taken him much longer to finish his degree.

Davies now designs bridges and roads as an engineering associate with the Washington County Department of Land Use and Transportation outside Portland.

The Young scholarship endowment is now worth more than $800,000 and has awarded grants to 100 students to date. **M!**

Romel Hernandez contributed to this story.



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