engineeringworldhealth

Annual Report

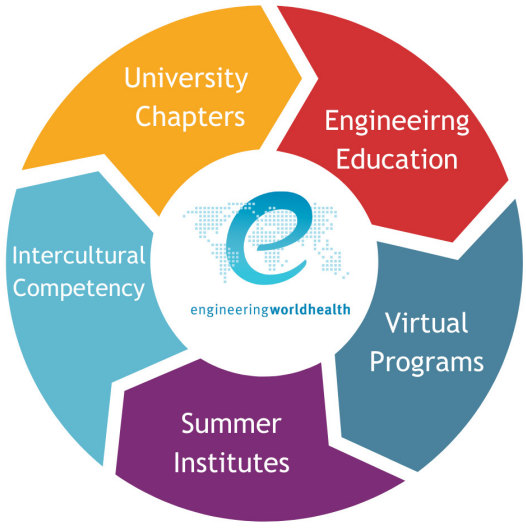
October 2019—September 2020

Letter from the Board Chair and the CEO

Dear Friends of Engineering World Health,

We've gone through a lot of changes this year. Some, such as our CEO transition as Leslie Calman retired, were planned and expected. Others, such as the COVID-19 pandemic and the sudden changes in our programs it caused, were more surprising. Through it all, EWH has remained committed to our mission. We did what we do best. We were flexible, we adapted, and we found new ways to bring engineering students together for international exchange and education.

In response to the COVID-19 pandemic, EWH launched our first-ever virtual programs. This summer, we hosted 120 university engineering students from around the world as they learned about biomedical equipment and designed projects to address health needs in low-resource settings. In the following pages, read more about our work this year.



We know we can do even more.

For 2020-2021, we are adapting and expanding each of the five components to the left.

Your support can provide Engineering World Health with the resources we need to further adapt our programs to a changing international development landscape. With your help, we can meet the increased need for virtual resources and connections.

• **Summer & January Institutes** - In 2020, we were fortunate to be able to run the January Institute programs in Guatemala, Uganda, and Cambodia. While the Institute programs have been on hiatus during the pandemic, we plan to run programs in the summer of 2021 in Guatemala, Rwanda, Tanzania, Kosovo, and Nepal. Just as in 2020, we will continue to adapt to the changing environment in 2021.

• **University Chapters** - Our Chapters have always provided students with ways to learn and connect to the global biomedical engineering community. That network is now more important than ever. We have been working to expand our university Chapters program and provide greater benefits and support while students navigate the challenges of virtual environments, and plan to build even more connections in 2021.

• **Engineering Education** - Like university students, many K-12 students are doing their best to learn remotely. EWH's Kits provide students with a hands-on opportunity to engage with key engineering concepts at home while connecting what they learn with real world biomedical

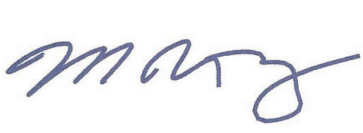
applications. At the same time, we are expanding our online BMET Library to provide much-needed resources for biomedical technicians around the globe.

• **Virtual Programming** - With the success of our Virtual Innovation Exchange and Remote Summer Institute programs this year, we are developing opportunities for high school and university students for winter and spring virtual institutes. Participants will gain design experience as well as understanding of the role of engineering in global health.

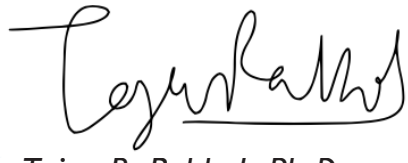
• **Intercultural Competency** - Fostering intercultural competency is a core aspect of all of our programs. We will develop improved intercultural teachings to better prepare students for international collaboration. We started by revising our textbook and lab book this summer and will continue by creating relevant training materials for each of our programs.

Engineering World Health inspires, educates, and empowers the next generation of young engineers to tackle global health challenges and improve healthcare delivery. 2020 has thrust global health into the spotlight, and we are ready to continue our critical work aiding service delivery. We are grateful for your support of our efforts every year, but it is more evident than ever that we could not do this without you. Thank you for sticking with us.

Best wishes,



Michael R. Tracey, Ph.D.
Chair of the Board of Directors



Tojan B. Rahhal, Ph.D.
President and CEO

Our Mission

To inspire, educate, and empower the biomedical community to improve healthcare delivery in the developing world.

Engineering World Health:

- Provides students from around the world with the life-changing educational experience of repairing vital medical equipment in the world's most resource-poor communities.
- In collaboration with local partners in Asia, Africa, and Central America, creates locally-sustainable training programs for biomedical engineering technicians (BMETs).
- Engages the next generation through K-12 STEM (science, technology, engineering and math) curricula, university chapters, and design activities to improve global health.

EWH believes we have a responsibility to stay true to these values:

- Ensuring a scientifically-based and creative educational experience.
- Leaving the communities in which we work with greater capacity than we found them.
- Empowering the biomedical community through intercultural exchange.
- Finding workable solutions through innovation and creativity.
- Serving while partnering with local educators, hospitals, and clinics.
- Promoting self-reliance and capacity building.
- Providing challenge without compromising safety.
- Cultivating and preserving a culture of diversity, inclusion, and equity.

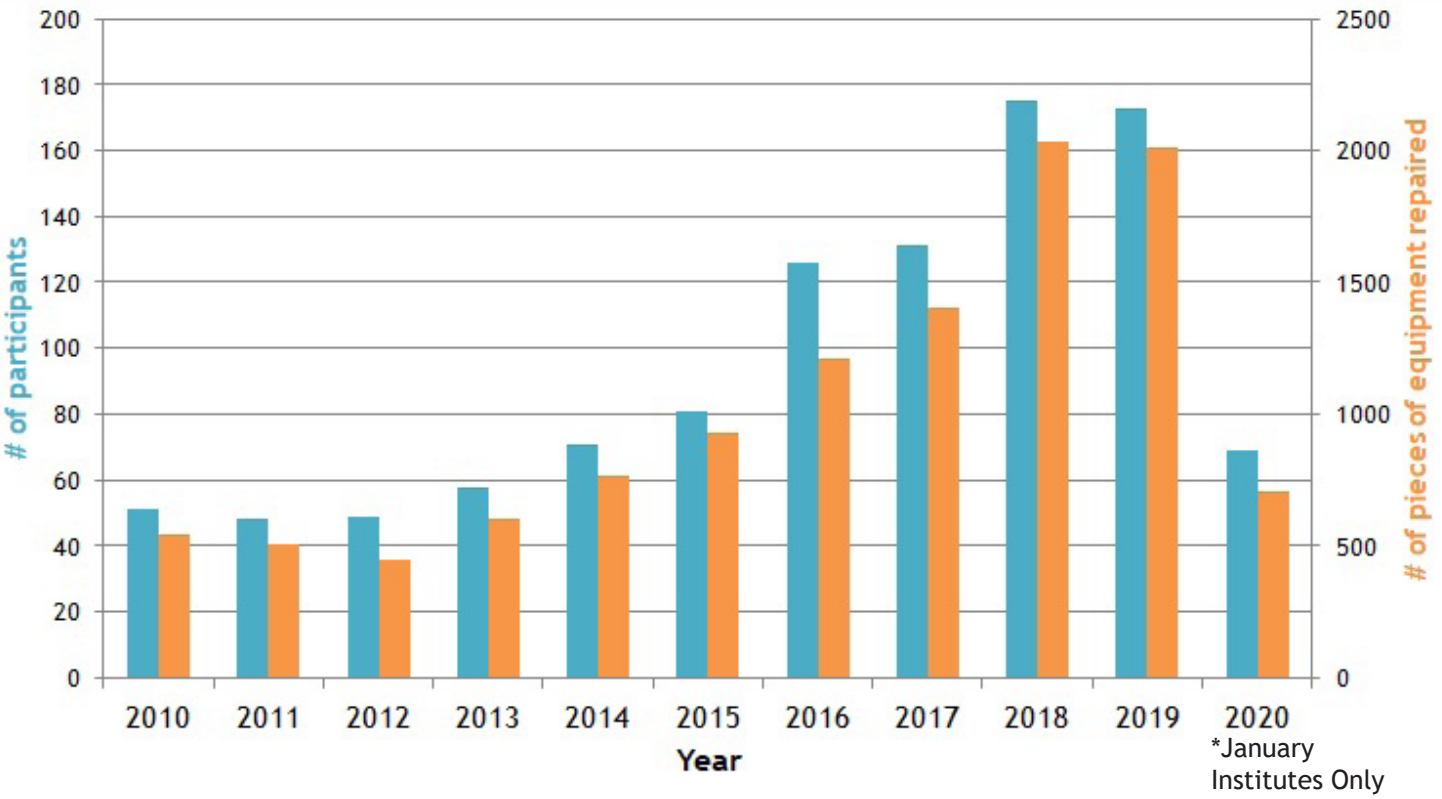
January Institutes

The COVID-19 pandemic dominated 2020. It is impossible to talk about this year without discussing the impacts of COVID-19. In late February, we wrapped up the January Institute programs without incident. We were in the process of enrolling our summer cohort - 91 participants were ready to go. By late March, it was abundantly clear that we would not be able to run the Summer Institute programs - borders were closing, travel restrictions were increasing, and even if we had been able to place students, it was not safe to do so for either our participants or our partner hospitals. In the face of great uncertainty, **we canceled the Summer Institute programs for the first time in EWH's existence.**

Still, we were lucky. **The January Institutes were very productive:** 69 volunteers joined the January programs in three countries this year. The participants, about 45% of whom were women, carried passports from 8 countries and represented 8 universities. Together, they repaired 708 pieces of equipment - including 37 oxygen concentrators - worth an estimated $1.44 million.

EWH is grateful for our 2020 January Institute partners: Rochester Institute of Technology and George Mason University in the United States, the University of New South Wales in Australia, the University of Puthisastra in Cambodia, and Makerere University in Uganda. We look forward to resuming our work with all of our partners in 2021.

The Impact of COVID-19: Institutes by Number of Participants and Equipment Repaired, 2010-2020



"I loved the friendships I built with the hospital staff on my placement. I feel as though I clicked with my BMETs on the first day and from that they grew to trust in our team very easily." — Danika Luichareonkit, Cambodia

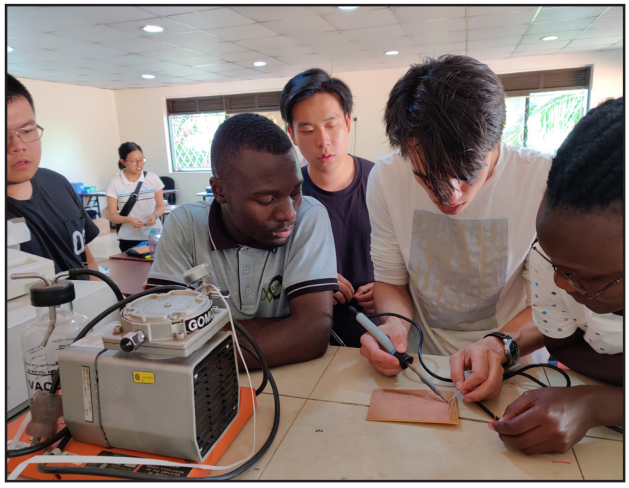
January Institute Country	University Partner	Number of Participants	Pieces of Equipment Returned to Service	Estimated Value
Cambodia	UNSW	29	250	$500,000
Uganda	UNSW	27	389	$778,000
Guatemala	RIT & GMU	13	81	$162,000

"Immersion into the vastly different Cambodian culture, getting close with Khmer families and hospital staff, expanded my horizons in a positive way."
— Kevin Kuang, Cambodia

"My favourite experience would be repairing the theatre light in Mpigi. It was one of the easier problems to fix, but the director sought out us afterwards to thank us. He was so glad that operations could be carried out under lighting, and it helped me to see that everything we could contribute, even repairs that seemed simple, could have a great impact on people's lives." — Wendy Ji, Uganda

"I enjoyed being challenged. I was put out of my comfort zone and I realized I could do a lot more than I initially would have thought."

— Mary Young, Guatemala



"We painted and made small renovations to the hospital's most regularly used outdoor kitchen. The gratitude of the people using that space for doing just that made the experience really memorable."

– Annie John, Cambodia

"We were able to work as a group and put back into use a very old oxygen concentrator. This was the only one of this kind of machine inside the male ward. Without this machine or any oxygen cylinders, patients can suffer catastrophic consequences."

— Nero Do, Uganda

"One memorable day started with a power cut which had been going on since 6am, and when we arrived at our normal clock-in time of 9am, we were called by the nurses from the neonatal ward. They hadn't had power all morning, meaning no heat and no oxygen from the hospital's oxygen plant. We promptly sprinted an oxygen cylinder up 3 flights of stairs to find a room packed with 17 neonatal babies, their mothers praying on the floor. Me and my partner Rachael got to work installing the cylinder, while my other teammate, Ray, repaired a heater they were using to warm the room due to the lack of infant warmers. Situations like these, once over and sorted, were powerfully cathartic." — James Davies, Uganda

University Chapters

Through University Chapters, the next generation of engineers raises awareness of global health challenges and innovates solutions to the medical technology issues unique to low-resource settings. Participation in EWH University Chapters helps students connect to a global network of biomedical engineers who share their passion and introduces them to ways they, too, can make a difference.

In 2020, 27 student Chapters from universities all over the world affiliated with EWH.

US Chapters

Case Western University
Clemson University
Duke University
George Washington University
LeTourneau University
Michigan Tech University
University of Arkansas
University of Bridgeport
University of Buffalo
University of California San Diego
University of Illinois-Chicago
University of Maryland
University of Minnesota - Twin Cities
University of Portland
University of Rochester
University of Texas-Dallas
University of Vermont

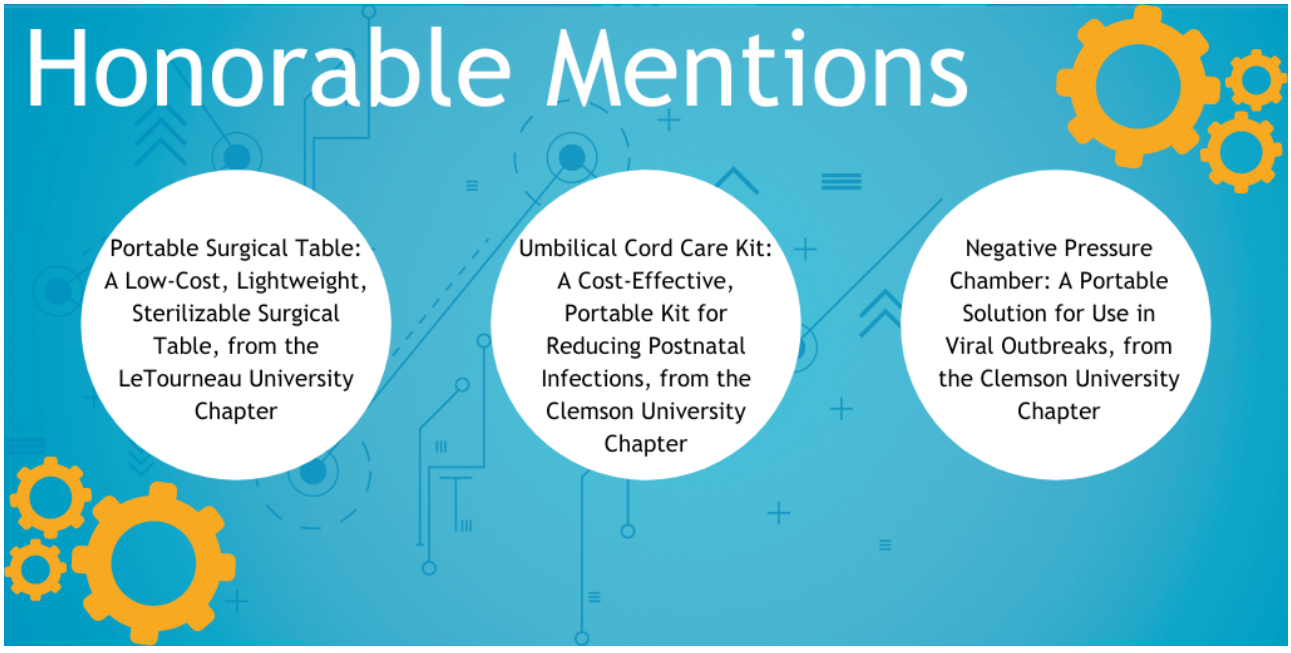
International Chapters

Autonomous University of Mexico State
Chung Yuan Christian University, Taiwan
Makerere University, Uganda
Technical University of Denmark
University of Aalborg, Denmark
University of Auckland, New Zealand
University of Canterbury, New Zealand
University of Ghana
University of New South Wales, Australia
University of Queensland, Australia

*The 2020 Chapter of the Year is the **University of Maryland, College Park Chapter!** Their 3D-printing and design projects, along with their volunteer activities, showed dedication to helping others through engineering. Congratulations, UMD!*

Design Competition

EWH University Chapters are invited to participate in our annual Design Competition for cash prizes. Through extensive interviews with healthcare providers in low-resource settings, EWH identifies healthcare technology needs and then challenges teams to design new solutions to deliver the improved care for patients. This year, EWH received 14 entries. Learn more about the winning designs on our website.



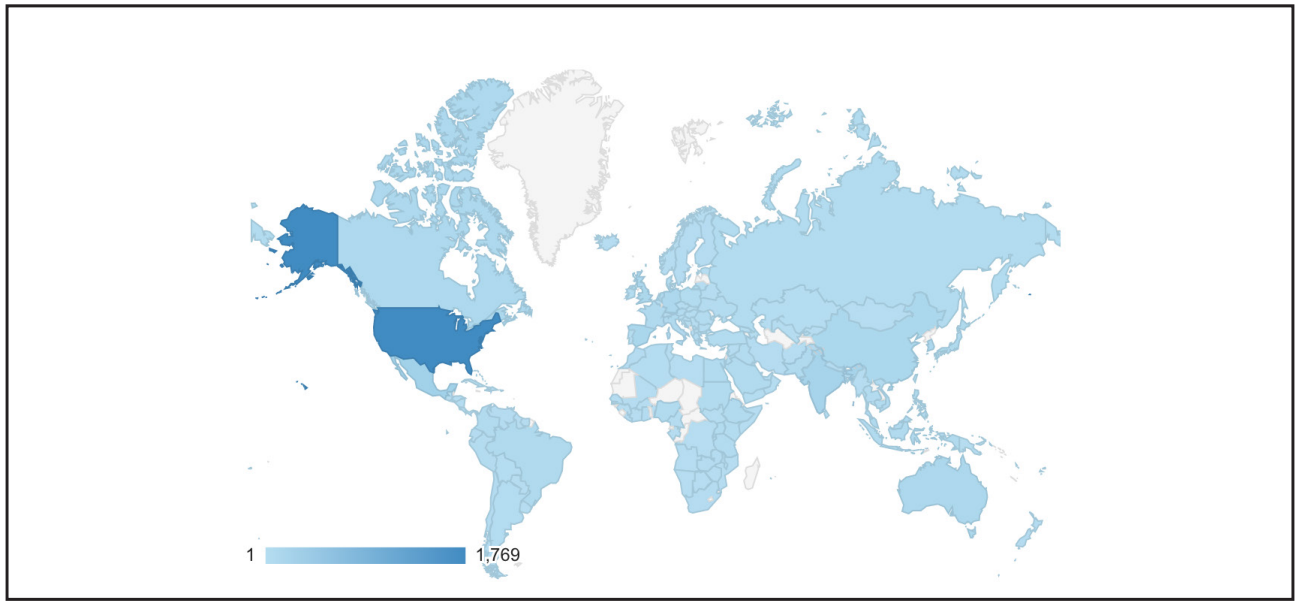
Engineering Education

Through Engineering Education, EWH reaches students of all ages. We provide resources to Biomedical Equipment Technicians through our online BMET Library, and, for K-12 students, we use STEM Kits to engage the next generation of engineers and to demonstrate the real-world applications of what they're learning.

BMET Library

Now in its fifth year, EWH's online, open-access BMET Library continues to be a resource for technicians and engineers around the globe. The BMET Library has proven to be an essential resource during the COVID-19 pandemic. In 2019, the BMET Library saw 1,700 users. **In 2020, it has seen over 5,000 users.** In our efforts to support BMETs during the pandemic, our collection of resources, guides, and user manuals grew from just over 1,000 items to over 1,900.

BMET Library Use By Country



Users visited the library from all over the world, with Mexico, India, Germany, and South Korea among our top 10 user-locations.

The Library — which can be found at http://library.ewh.org/ — now hosts over 1,900 items, including 37 textbooks, 156 items on professional development, and 24 articles focused on healthcare technology maintenance. The library includes a Spanish section, with 51 items. The User Manuals section now hosts 1560 user manuals from 78 manufacturers. If you have resources you think should be included in the BMET Library, you can share them with us: library@ewh.org.

Kits

EWH educational Kits continue to be popular with teachers, ranging from early engineering to advanced instrumentation courses. EWH's 3 Kits are based on biomedical devices and are designed to introduce students to engineering and circuitry through hands-on experience. Kits engage students in STEM learning, while the resources EWH provides emphasize the real-world applications of the lessons.

To asssist educators during the pandemic, EWH Kits were 50% off for much of 2020.

Jami Shepherd, an EWH alum from the 2013 Summer Institute in Rwanda, works with a club called STEM for Global Health and with the University of Auckland Chapter in New Zealand. This year, with the sponsorship of the Dodd-Walls Centre for Photonic and Quantum Technologies, they hosted a Kit build with intermediate students. They also ran a pilot program with Ormiston Junior College and Tonga high school students. Students worked together to first build optical heart rate monitor Kits and then brainstorm better designs for heart rate monitors. Their activities introduced students to biomedical engineering and allowed different-aged students to share their STEM experiences.

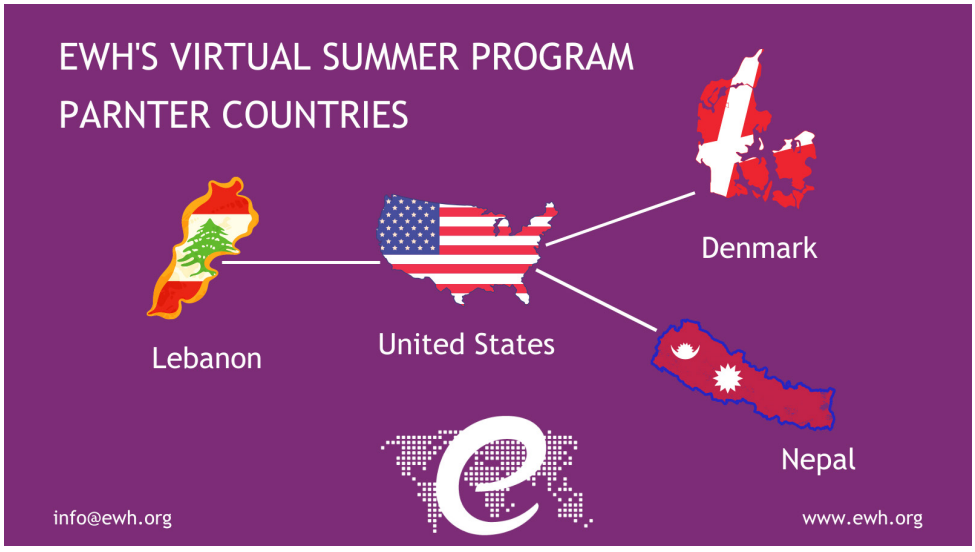
Looking Forward

Moving into 2021, EWH is building new partnerships with STEM educators and others to facilitate outreach to K-12 students, especially students from Title I schools and others underrepresented in STEM fields. We are also working to develop new curriculua and resources to help educators bring STEM into their classrooms.

If you'd like to bring EWH Kits into your classroom, email us at kits@ewh.org!

Virtual Programming

Due to COVID-19, we could not run the Summer Institutes, so we began to search for new ways to foster international exchange and engineering education. With the help of our partners at Rose-Hulman Institute of Technology (RHIT) and the Technical University of Denmark (DTU), we developed and hosted our first two virtual programs: the Virtual Innovation Exchange and the Remote Summer Institute. We would especially like to thank Dr. Deborah Walter from RHIT for her help with curriculum development and teaching.



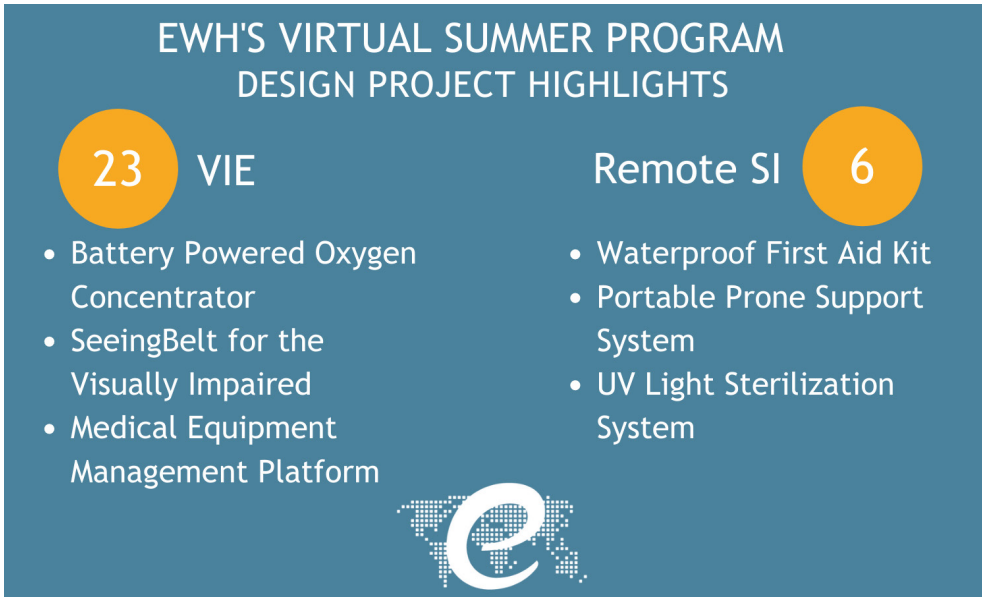
Virtual Innovation Exchange

A 5-week online design program, the VIE brought together groups of students from the United States and Lebanon. The VIE hosted 92 total participants from 23 different universities, including 44 participants American universities and 48 from Lebanese universities. Participants were divided into 4 cohorts, and then worked in small teams to complete 23 design projects focused on addressing a health need in a low-resource setting.

The VIE was supported by the Stevens Initiative, which is sponsored by the U.S. Department of State, with funding provided by the U.S. Government, and is administered by the Aspen Institute. The Stevens Initiative is also supported by the Bezos Family Foundation and the governments of Morocco and the United Arab Emirates.

Remote Summer Institute

Supported by Mr. Flemming Topsoe, who also supports the Summer Institute in Nepal, the Remote SI program brought together students from the United States, Denmark, Norway, and Nepal. We hosted 28 total participants from 8 different universities, including 4 participants from universities in Scandinavia, 8 from American universities, and 16 from universities in Nepal. Participants were divided into 6 teams, and each team completed a design project which addressed a health need in low-resource settings.



The final presentations for each team's design project are available on our YouTube Channel. See the VIE presentations here and the Remote SI presentations here.

Looking Forward

Given the success of our summer virtual programs, EWH plans to continue offering similar virtual educational opportunities going forward. These programs offer a lower-cost alternative to students while still fostering international collaboration. In January 2021, EWH will host a Virtual Winter Institute for US and Ugandan engineering students. Following that, we plan to continue partnering with universities to expand these programs.

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**In Memoriam*

Creation of the Lynn Toby Fisher Scholarship Fund for Programs in Low-Resource Countries

Lynn Toby Fisher was a brilliant, warm, and generous woman who was deeply committed to the values exemplified in Engineering World Health's work: education, international engagement and understanding, science and innovation. A member of the Board of Directors of Engineering World Health from 2014 until her untimely death in 2020, Lynn was especially passionate about EWH's outreach to, and support of, engineering and science students from the countries in which Engineering World Health provides services, especially economically disadvantaged students.

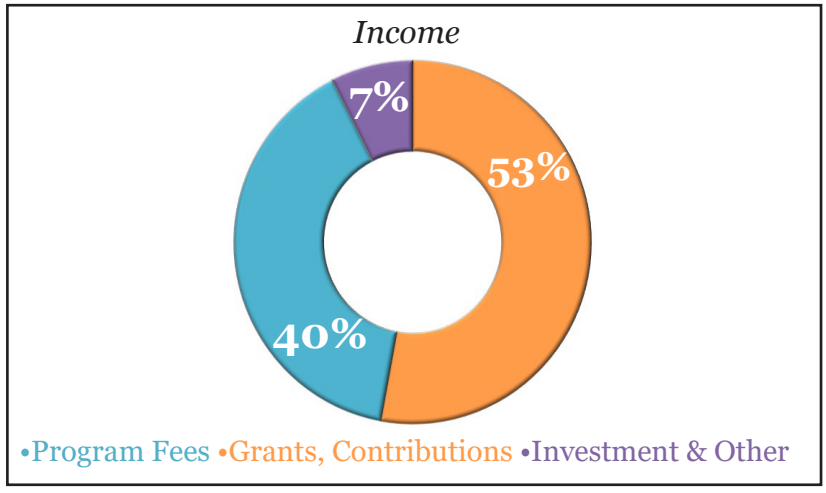
To support EWH in this mission, friends and family established the *Lynn Toby Fisher Scholarship Fund for Programs in Low-Resource Countries*. The purpose of the Fund is to enable economically disadvantaged students to participate in EWH programs in low-resource countries, and in particular to enable the inclusion of students from the host countries.

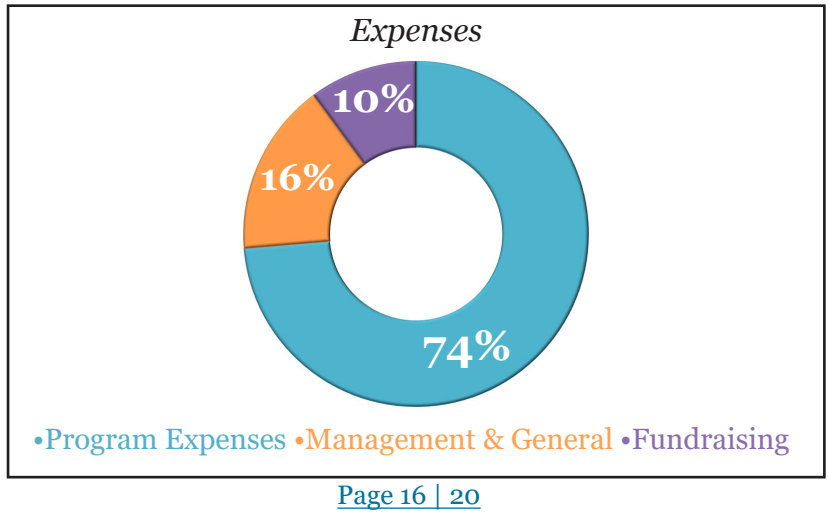
The Fund has already benefited from the generosity of Lynn's husband, John Lee Compton, and a host of Lynn's friends and colleagues. EWH plans to grow the Fund into the future. Donors are welcome to contribute to the Lynn Toby Fisher Fund by designating it on their donations in a note or comment.

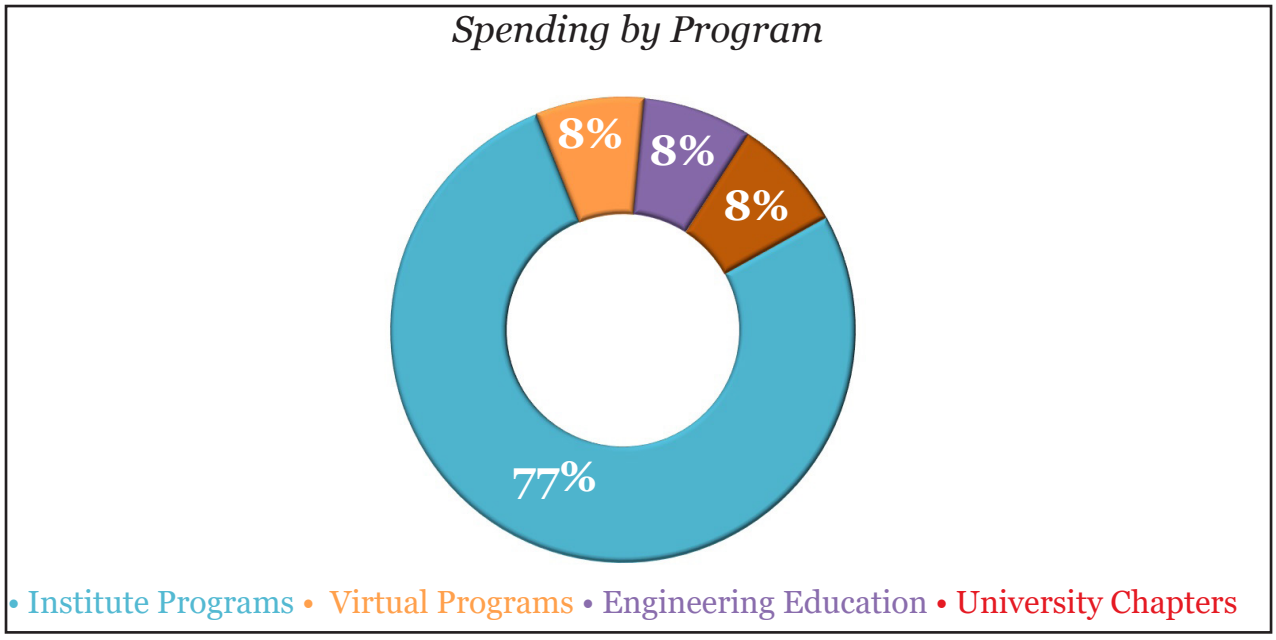
Lynn and Lee joined EWH's CEO Leslie Calman for the Summer Institute's final conference in Nicaragua in 2013.

Engineering World Health
Statements of Financial Position

Statement of Activities	FYE 9/30/20	FYE 9/30/19
Revenue, Support, & Other Income		
Grants & Contributions	$425,846	$340,537
Program Fees	319,731	802,028
Investment & Other Income	59,407	16,391
Total Revenue, Support, & Other Income	$804,984	$1,158,956
Expenses		
Program Expenses	$572,306	$1,001,591
Management & General	125,863	97,429
Fundraising	78,373	77,211
Total Expenses	$776,542	$1,175,231
Net Assets		
Change in Net Assets	$28,442	$(16,275)
Net Assets at Beginning of Year	$789,511	$805,786
Net Assets at End of Year	$817,952	$789,511







Programs	Spending
Institute Programs	$440,558
Virtual Programs	$43,398
Engineering Education	$43,314
University Chapters	$45,036

2020 Funding Partners

Foundation and Corporate Donors

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Corning Foundation
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Special thanks to the Wallace H. Coulter Foundation for the early and generous support that enabled us to grow.

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Sherry Wolf
Jimmy Xiao

Thank you to everyone who has supported Engineering World Health! Your generous contributions build a healthier future.

> *"Being at a small hospital, every fix had a direct and immediate positive impact on the outcomes of the hospital, so it was immediately rewarding, and motivated us to fix everything we could get our hands on." — Katie O'Sullivan, Uganda*

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Saving Equipment Is Saving Lives

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