

engineering worldhealth

Annual Report October 2020 - September 2021



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LETTER FROM THE BOARD CHAIR AND CEO

Dear Friends of Engineering World Health,

As the world continues to face unprecedented global health challenges, our dedicated team at EWH has continued to do what we do best: adapt and find ways to achieve our mission both at home and abroad.

Last year, in response to the COVID-19 pandemic, EWH launched our first-ever <u>virtual</u> <u>programs</u>. This year, we continued to build on that framework and create a robust offering of virtual opportunities to foster international exchange and collaboration even while travel is not possible, facilitating cross-cultural experiences for nearly 250 high school and university students across three continents. In April, we were thrilled to be named one of nineteen 2021 <u>Stevens Initiative</u> grantees to continue implementing our Virtual Engineering Innovation and Cultural Exchange program through 2022. We have an exciting roster of innovative programs planned for the next year to provide even more students around the world with experience working on international teams to solve global health challenges, including our first-ever virtual <u>design competition for high school students</u>.

Our <u>Kits for Classrooms program</u> has grown exponentially in the last year, providing hundreds of students in Title I K-12 schools across three states with free hands-on STEM learning opportunities and introducing students to global health concepts through real world applications. In August, our President & CEO, Dr. Tojan B. Rahhal, was named one of <u>"10 to Watch,"</u> nonprofit leaders by United Way of the Greater Triangle in North Carolina; funding from this program and other generous supporters will enable us to grow this program even further in 2022.

Your support has enabled us to continue finding innovative solutions and creative ways to inspire, educate, and empower the biomedical engineering community to improve health care delivery in the developing world. In 2021-2022, we'll continue to enhance and expand our work in each of these five strategic focus areas:

- <u>Summer & January Institutes</u> | While Institute programs remained on hold this last year, in 2022, EWH plans to ease back into in-person programming with Summer Institutes in Guatemala, the Dominican Republic, and Rwanda. Just as in 2021, we will continue to monitor and adapt to the changing environment in 2022.
- <u>University Chapters</u> | Our Chapters provide students with ways to learn and connect to the global biomedical engineering community. That network is more important now than ever. We have been working to expand our university Chapters program and provide more resources and support to students as they continue to navigate the challenges of virtual environments and return to in-person education.

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- Engineering Education | EWH's Kits provide students with hands-on opportunities to engage with key engineering concepts and connect what they learn with practical biomedical applications. Our growing <u>BMET</u> <u>Library</u> provides free access to resources for the repair and maintenance of vital medical equipment to hundreds of users around the world each month.
- <u>Virtual Programs</u> | Building on the success of last year's virtual programs, we've continued to develop new opportunities for high school and university students around the world to connect and learn about the role of engineering in global health. With university partners in the US and abroad, we'll continue to expand our virtual program offerings and facilitate access to high-quality education opportunities for all engineering students. Find more information about 2022 programs at <u>www.ewh.org</u>.
- **Intercultural Competency** | Fostering intercultural competency and exchange is at the core of each of our programs. We've been working to develop improved intercultural teachings to better prepare students for international work and collaboration. In 2021-2022, each of our programs will include relevant training materials to ensure that students are getting the most out of each experience.

As always, and more than ever, we are grateful for your continued support of our work. Your investment in the next generation of engineers and healthcare professionals is more important than ever as we continue to face unprecedented global health challenges. Together, we can inspire, educate, and empower students and professionals around the world to make strides in improving healthcare delivery across the globe. *Thank you!*



Tojan B. Rahhal Ph.D., LL.M President & CEO



Michael R. Tracey, Ph.D. Board Chair

OUR MISSION

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

WHAT WE DO

- Provide students from around the world with the life-changing educational experience of repairing vital medical equipment in the world's most resource-poor communities
- Engage the next generation through K-12 STEM programming, university chapters, and design activities to improve global health
- In collaboration with local partners in Asia, Africa, and Central America, create locallysustainable training programs for biomedical engineering technicians (BMETs)



OUR RESPONSIBILITIES

- 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, equity, and inclusion

SUMMER + JANUARY INSTITUTES



In 2021, our Summer and January Institute programs remained on hold due to the COVID-19 pandemic and related travel restrictions and concerns. Looking forward to 2022, we're hopeful that increasing vaccination rates and easing travel restrictions will enable us to travel safely with students once again.

We have tentatively planned to move ahead with <u>Summer Institutes</u> in Guatemala, the Dominican Republic, and Rwanda. As always, our team will continue to keep an eye on changing environments and adapt as necessary.

As we look forward to resuming in-person programs in 2022, EWH is more committed than ever to making our programs accessible to economically disadvantaged students and students from our Institute host countries. One way we'll do this is by supporting students with financial aid through the <u>Lynn Toby Fisher Scholarship</u> <u>Fund.</u>

THE LYNN TOBY FISHER SCHOLARSHIP FUND

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 EWH's Board of Directors 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.



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.



Learn more and make a contribution to the fund at <u>https://ewh.org/support-us/the-lynn-toby-fisher-scholarship-fund/</u>

UNIVERSITY CHAPTERS

Through <u>University Chapters</u>, 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 that they, too, can make a difference. **In 2021, our network of Chapters around the world grew from 20 to 34!**

US CHAPTERS

Arizona State University University of Bridgeport Case Western Reserve University Clemson University University of Connecticut Cornell University University of California San Diego

Duke University University of Illinois - Chicago University of Maryland University of Minnesota - Twin Cities North Carolina State University Purdue University Rochester Institute of Technology University of Rochester Syracuse University University of Texas at Austin Vanderbilt University University of Vermont Virginia Tech Washington and Lee University

INTERNATIONAL CHAPTERS

Aalborg University | Denmark Chung Yuan Christian University | Taiwan University College Dublin | Ireland Technical University of Denmark

University of Ghana Makerere University | Uganda National Autonomous University of Mexico University of Science and Technology | Yemen

CHAPTER OF THE YEAR

The outstanding group of 34 university students at <u>University College Dublin</u> has been hard at work in the last year, growing their chapter membership, raising awareness about opportunities in STEM, and coming up with innovative solutions to global health challenges! In 2021 they:

• Completed design projects including an affordable simulator model for bronchoscopy training to address the lack of equipment in Uganda, as well a device to more safely administer epilepsy medication

- Designed and implemented a STEM outreach program aimed at students ages 13-18
- Participated in the NovaUCD Student Enterprise competition and presented two entries for the EWH Design Competition at the Dublin Maker Festival
- Made it to the semi-finalist round of the Cisco Global Problem Solver Challenge
- Won the UCD Investors and Entrepreneurs Startup Accelerator & Dragons' Den Pitch Off
- Launched the first ever EWH UCD 24 hour hackathon, Irish Solutions to Global Problems, with over 100 participants!



UNIVERSITY CHAPTERS | DESIGN COMPETITION

EWH University Chapters are invited to participate in our annual <u>Design Competition</u> for cash prizes. Through extensive interviews with healthcare providers in low-resource settings, EWH identifies healthcare technology needs then challenges teams to design new solutions to improve patient care. This year, EWH received 12 entries from 6 schools. Learn more about the winning designs at <u>www.ewh.org/chapters/design-competition</u>!

2021 COMPETITION WINNERS

1ST PLACE University of Texas at Austin

Automated Leukemia Detection: A Low-Cost, All-In One Method to Detect Leukemia from Blood Smear Images Using Convolutional Neural Networks





2ND PLACE

University College Dublin

MidazoClamp: A Minimally invasive, fast-acting, transbuccal drug delivery device that deploys seizure drugs easily and with minimum risk

3RD PLACE

University of Texas at Austin

Low-Cost, EEG Based Wearable Seizure Prediction Alarm

HONORABLE MENTION

University of California San Diego

Newborn Resuscitation Device

ENGINEERING EDUCATION | BMET LIBRARY

Now in its sixth year, EWH's online, open-access <u>BMET Library</u> continues to be a critical resource for technicians and engineers around the globe. The BMET Library has proven to be an essential resource during the COVID-19 pandemic, **growing from 1,700 users in 2019 to nearly 9,000 users around the world in 2021**. As part of our efforts to support BMETs during the pandemic, during the last two years we've grown our collection of resources, guides, and user manuals from just over 1,000 in 2019 to 2,600 in 2021.



BMET Library Use by Country

Users visited the BMET Library from all over the world, with United States, Netherlands, France, the Czech Republic, and Switzerland among our top five user locations.

The Library - which can be found at <u>http://library.ewh.org/</u> - hosts textbooks, user manuals, items on professional development, articles focused on healthcare technology maintenance, and growing video and foreign language sections, including 136 items in Spanish and 132 items in French.



Do you have resources that you think should be included in EWH's BMET Library? Share them with us by emailing library@ewh.org!

ENGINEERING EDUCATION | KITS FOR THE CLASSROOM

In 2021 we launched <u>Kits for the Classroom</u>, which provides free, hands-on STEM education to **Title I K-12 schools** across the U.S. Our <u>three Kits</u> 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 each lesson.





169 KITS DISTRIBUTED

750 STUDENTS IMPACTED





TITLE I SCHOOLS

3 US STATES

Thanks to support from EWH partners and donors, in 2021 we've been able to provide free STEM learning opportunities to students **grades 4-8** in five Title 1 schools across three US states. Over 100 students have been impacted by these Kits so far, and teachers have planned to reuse the kits with additional 600 students in the coming year.



In addition to parts to build each Kit, EWH provides each classroom with supplies and lesson materials, works with teachers to fit the activity into their curriculum, and even helps implement the activity by guiding students through virtual build sessions.



Learn more about our Kits and the Kits for the Classroom program at <u>www.ewh.org/kits</u>



Funding to pilot and grow the Kits for the Classroom program was provided by our generous sponsors:

Danaher Foundation FJC - A Foundation of Philanthropic Funds United Way of the Greater Triangle

VIRTUAL PROGRAMS

UGANDA VIRTUAL WINTER INSTITUTE

Following the success of EWH's virtual summer programs, we launched the <u>Virtual Winter</u> <u>Institute</u>, which hosted **42 total participants, including, for the first time, high school students**. The university cohort included 35 students from 13 different universities in the US and Uganda, while the high school cohort included 4 American students and 3 Ugandan students.

Participants were divided into 7 university teams and 1 high school team. During the 3-week program, students participated in technical training comprised online lectures, virtual team assignments, and live sessions with team mentors. Each university team developed a design which addressed a health need in a low-resource setting, while the high school team explored several possible solutions. The university participants collectively produced 7 complete design projects based around oxygen concentration, sterilization, and medical equipment supply lines.

"I definitely learned a lot about the specifics of sterilization in low-resourcehospitals, and how medical needs in different countries/areas vary greatly from whatI might expect in the U.S. Also, I feel like I learned more about how to work in agroup, especially virtually, and how to communicate effectively and efficiently."

UGANDA MAKERERE - BERKELEY VIRTUAL EXCHANGE

In June 2021, EWH's <u>Makerere-Berkeley Virtual Exchange</u> brought together students from Makerere University in Kampala, Uganda, and the University of California, Berkeley in California. 16 students worked and learned together remotely throughout the course, which covered concepts for biomedical design, collaboration, ethics, and entrepreneurship as these topics relate to engineering for low-resource environments. Students worked independently through self-directed learning modules and collaborated virtually in groups to further develop design ideas and exchange knowledge. Teams were led by program mentors from Uganda or the US with significant engineering background and experience in low-resource hospitals to help them throughout the process.



VIRTUAL PROGRAMS

LEBANON & JORDAN VIRTUAL ENGINEERING INNOVATION AND CULTURAL EXCHANGE

Over the summer, EWH offered a free virtual design program bringing together students from the United States, Lebanon, and Jordan. This year's <u>Virtual Engineering Innovation and Cultural</u> <u>Exchange</u> program, which is supported by the Stevens Initiative, focused on low-resource design and engineering for healthcare in an international setting.

Over the course of four to six weeks, 193 high school and university students across three different cohorts worked together remotely on international teams, learning about concepts for biomedical design, collaboration, ethics, and entrepreneurship as these topics relate to engineering for low-resource environments.



Students worked independently through self-directed learning modules and collaborated virtually to further develop design ideas and exchange knowledge with help from program mentors with significant engineering background and experience in low-resource hospitals. At the culmination of each program, teams presented their design projects, which ranged from renewable energy sources to provide electricity for medical equipment in remote settings to oxygen leak monitoring systems and low-cost sanitation methods for surgical tools.

In addition to learning new engineering concepts, this virtual exchange experience used technology to connect young people across continents and cultures, enabling hundreds of students to collaborate and learn with their peers abroad without having to leave their communities.

"Thank you sincerely for the experience! A very informative program and I gained friends along the way ... It was really interesting learning about engineering in a way that I haven't really done in school yet, such as low-resource settings and the cultural influences in engineering design"



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

THE IMPACT OF VIRTUAL EXCHANGE

Naja K., 22, and Deema K., 22, served as facilitators for EWH's 2021 Virtual Engineering Innovation and Cultural Exchange (VEIC) program. They participated in the Summer 2020 iteration of VEIC, which brings together students from the United States and Lebanon for a course focused on low-resource design and engineering for healthcare in an international setting.

As students in last year's program, over the course of five weeks, Naja and Deema had the opportunity to meet people from different backgrounds and cultures and improve their communication and teamwork skills by working together on biomedical engineering projects.



They wanted to build upon what was already an enriching experience from last year, so when they were asked to return as facilitators, the answer was an easy "yes." From June through August, Naja and Deema spent a total of 12 weeks working with high school and university students from the United States and Lebanon, acting as mentors and guides as students worked through self-directed learning modules, collaborated virtually in groups, and innovated solutions to global health challenges. Because of their own participation in the program prior to facilitating, Naja and Deema are able to leverage their own experience participating in the program to support current participants. "I learned so much: I truly felt I was submerged in the different cultures," said Deema about her experience working with program participants on her teams, EWH staff, and other facilitators.

Both Naja and Deema would recommend that other students participate in EWH's virtual programs in the future, and seek out other opportunities for cross-cultural exchange. "You have the chance to meet different people and know more about their cultures, while also working on something that is important: innovating for healthcare in low-resource settings," said Naja.



For more information about EWH's VEIC Exchange and other upcoming virtual programs, visit <u>https://ewh.org/the-institutes/virtual-programs/</u>

IN OTHER NEWS

EWH PRESIDENT & CEO NAMED ONE OF "TEN TO WATCH"

EWH's President & CEO, Tojan B. Rahhal, Ph.D., LL.M, has been named one of <u>"10 to Watch,"</u> nonprofit leaders by United Way of the Greater Triangle. The "10 to Watch" are a group of leaders selected for their proven impact within their communities and unique potential to shape the future of the Greater Triangle area of North Carolina. The initiative invests more than a half million dollars over two years — \$25K invested in each leader and organization per year — in ten high-impact organizations in the Greater Triangle led by Black, Latinx, and/or Woman leaders. In addition, "10 to Watch" cohort members participate in rigorous leadership development opportunities.



EWH WEBINARS

In October, EWH hosted its first in a series of webinars slated for the next year, "Challenges to Medical Equipment Maintenance in Low-Resource Settings" with Senior Projects Manager Megan Lavery. Join EWH and a select group of VEIC alumni on Thursday, December 2 at 12:00 PM EST for our next event, a lunchtime panel discussion about the virtual exchange experience! **To watch recordings of past events and find more information about upcoming webinars, visit:** <u>https://ewh.org/news/webinars/</u>.

HIGH SCHOOL DESIGN COMPETITION



Since the beginning of the COVID-19 pandemic, EWH has offered virtual programs to facilitate cross cultural exchange and engineering education opportunities for students even when travel is not possible. In 2022, we'll host our inaugural virtual design competition for high school students and seek individual or group student submissions for an independent study that focuses on finding solutions to global health problems. Students participate via Google classroom and work with EWH staff to develop a project and hear from experts in the field. Cash prizes will be awarded for winning projects! **For more information, visit: <u>https://ewh.org/hsdc/</u>.**

FINANCIAL STATEMENTS

Statement of Activities	FYE 9/30/20	FYE 9/30/21
Revenue, Support & Other Income		
Grants and Contributions	\$425,846	\$253,971
Program Fees	319,731	57,187
Investment and Other Income	59,407	208,006
Total Revenue, Support & Other Income	\$804,984	\$519,164
Expenses		
Program Expenses	\$572,409	\$341,259
Management and General	125,863	151,608
Fundraising	78,373	51,179
Total Expenses	\$776,645	\$544,046
Net Assets		
Change in Net Assets	\$28,339	(\$24,882)
Net Assets at Beginning of Year	\$789,511	\$817,850
Net Assets at End of Year	\$817,850	\$792,968



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Follow EWH throughout the year and stay up to date on upcoming programs and opportunities!



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