

Matter of Opinion

An REU Experience Around the Globe

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The COVID-19 pandemic caused the cancellation of many summer undergraduate research experiences. UC San Diego's Adam J. Engler quickly adapted his REU to an online program—opening up the opportunity to hundreds of students worldwide.

For over 30 years, the National Science Foundation has funded Research Experiences for Undergraduates (REU) programs at universities across the United States, giving students the opportunity to work in the research programs of host institutions over the summer. REUs are competitive summer research programs in the United States for undergraduates studying science, engineering, or mathematics. One of the key benefits of the REUs was that students get to visit and work at host universities in lab and in person. However, due to the COVID-19 pandemic, one REU institution, UC San Diego, made the decision for summer classes and programs to be moved online in early May. UCSD bioengineering professor and REU site director Adam J. Engler polled the faculty and made the tough decision to postpone the in-person research experience for their 10 accepted students until the following summer.

Shortly after the announcement was made, Engler was contacted by an REU applicant that had previously not been accepted, asking if she could “be reconsidered for admission due to the wide breadth of sharing services that remote learning offers.” Engler considered how easily an online opportunity could scale, and it was apparent that the impact on students would make it well worth the effort. He got co-director Robert Gaetani and the ten other affiliated faculty members on board, and by late May signups were up and running. By sharing widely among his own network and promoting more broadly via Twitter (Figure 1), over 700 students from around the world had registered by the start of the REU program in June.

Virtual Adaptation

While the online format prevented wet lab experiences, Engler found that a completely open program in which any undergraduate student could participate

garnered so much interest that it quickly exceeded the faculty's capabilities for one-on-one mentorship of virtual projects; UCSD simply could not come up with 700+ online, computational projects. With so many students losing their jobs, internships, or research experiences as a result of the pandemic, Engler did not want to keep the exclusivity of a small program with only 10 students and saw the opportunity to expand. In a typical REU summer, the UCSD program would have a number of professional development seminars: faculty talks, research skills workshops, and networking events, all of which could scale and transition easily to an online format. Engler decided on a schedule of 2–3 times per week, organizing 19 Zoom sessions over the course of 8 weeks on topics designed to inform students about both academic and biotechnology industries, such as “Bioethics in Research,” “How to Apply to Graduate School,” networking meet-and-greets with industrial employers, and research talks from UCSD faculty. Every session had over 100 live participants, and session recordings made available to the students had over 100 downloads for asynchronous viewing as well. Because of interest from a large number of students, Engler was able to add an extra session focused on MD/PhD programs—something that likely would not have happened in a 10 student in-person program.

What did not transfer easily is building a community. According to Engler, “it is easy when you have 10 students living together in one location; it is exceedingly hard when you have hundreds of participants scattered around the world with competing obligations at home.” In response, Engler opted to add three community activities where students could share their experiences and talk



Adam J. Engler @AdamEnglerUCSD · May 27

Lost your #undergrad summer #research opportunity during #COVID19? Then sign up for a #Biomaterials "Zoom" REU at @UCSDJacobs! Workshops, seminars, and more planned. Supported by @NSF. Sign up: forms.gle/8GSLixWbtAccze...



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Figure 1. A Tweet Made by Engler Promoting the Program Led to Several Hundred Signups in Only a Few Days

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Figure 2. Universities of the Zoom REU Student Attendees

about their pets, school, and the pandemic. Engler also created a Slack workspace for the REU participants to chat, ask career questions, and interact more casually with other participants (including sharing Netflix recommendations for quarantine).

Lessons Learned

Engler is glad for the enthusiasm for the program—though it did lead to some challenges. When running such a big event, he suggests getting IT staff on board ASAP. A Zoom call with hundreds of participants runs very differently than a Zoom call with only a few: “do you have sufficient capacity in your video conferencing software, and do you have the protections in place to make them secure? These may seem trivial now that we are nearly 6 months since the pandemic shutdown, but security

and capacity were only just being considered in April and May. Capacity issues for Zoom or Webex are often controlled by university administrators, so ask well in advance.”

However, the online format gave additional freedoms as well. Engler noted that “because we did not have the constraints of a federal program (which limits you to US citizens and permanent residents), we could include international students, students that had just graduated, and many more than the 10 for which we have funding.” Students in the virtual REU program were able to attend from 10 countries, 31 states, DC, and Puerto Rico, representing over 50 universities (Figure 2).

The virtual format was beneficial to students as well, the flexibility allowing

them to supplement their own summer plans with the Zoom events. Over 50% of REU attendees polled said that without the Zoom REU, they would not have participated in any research experience, either in person or virtually, over the summer. While Harvard student Esther Koh was able to secure a research internship at her college, UCSD’s program and the chance to meet with other university faculty and industry professionals drew her into signing up for the program’s events. Attending the virtual events, Koh “gained a lot of valuable advice on applying to grad schools and what life may be like as a grad student. I also learned about unique opportunities to get involved in the industry side of bioengineering from biotech startups to pharma,” during the program’s industry networking event.

Engler is eager to keep the Zoom REU program going, even after the pandemic ends and their REU program can have on-site students once again. “ [With so many participants], that reach vastly exceeds what we could do in person. I think that one of the lessons I’ve learned even for those who we cannot accept in-person in the future, we can still have an online component for non-in-person participants. In the past decade of our program, those students were lost to us. Now we can engage them and hopefully provide some benefit to their research experience.”