COVID-19 & ENGINEERING EDUCATION

AN INTERIM REPORT ON THE COMMUNITY RESPONSE TO THE PANDEMIC AND RACIAL JUSTICE

ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Founded in 1893, the American Society for Engineering Education (ASEE) is a global society of individual, institutional, and corporate members. ASEE's vision is excellent and broadly accessible education empowering students and engineering professionals to create a better world. We work toward achieving that vision by advancing innovation, excellence, and access at all levels of education for the engineering profession. We engage with engineering faculty, business leaders, college and high school students, parents, and teachers to enhance the engineering workforce of the nation. We are the only professional society addressing opportunities and challenges spanning all engineering disciplines, working across the breadth of academic education including teaching, research, and public service.

- We support education at the institutional level by linking faculty and staff across disciplines to create enhanced student learning and discovery.
- We support education across institutions by identifying opportunities to share proven and promising practices.
- We support education locally, regionally, and nationally by forging and reinforcing connections between academia, business, industry, and government.
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The Engineering Education Community's Response

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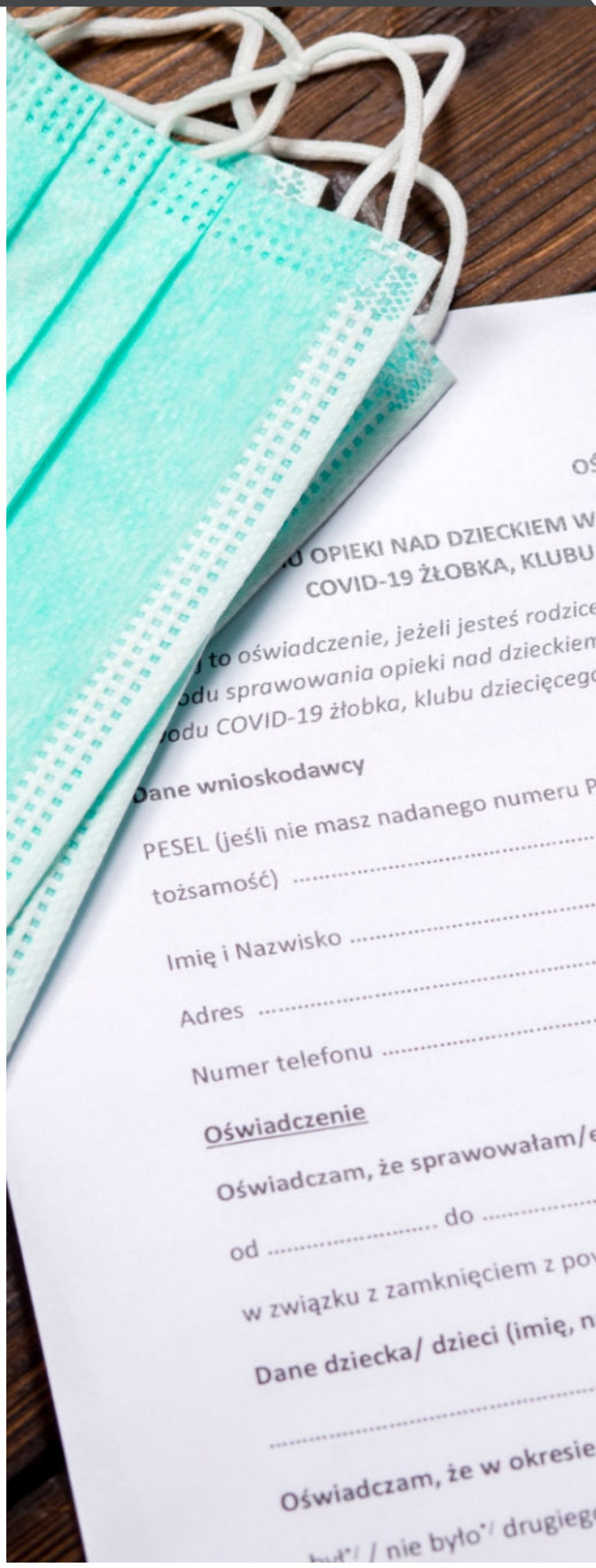
INTRODUCTION

The 2020 coronavirus pandemic disrupted education worldwide, forcing schools and colleges to suspend in-person classes and casting doubt on a full resumption of regular instruction until a safe and effective vaccine became widely available. Remote teaching, a growing but supplemental segment of higher education market, suddenly became the only safe option available, testing the flexibility and resilience of students, faculty, and administrators alike. Engineering educators faced a particular challenge in providing a virtual substitute for the lab-based, hands-on experiences and teamwork that their discipline demands. Research was sharply curtailed or limited to coronavirus-related topics, and in some cases halted altogether.

To help assess the impact of the COVID-19 crisis on the engineering education community, the American Society for Engineering Education (ASEE) conducted a qualitative survey in June and July of more than 200 members, including faculty, administrators, and students. The work was funded by the National Science Foundation. Respondents were asked to reflect on their colleges' initial response to the pandemic in March, how they felt in June having completed the semester, and their outlook for the fall. An open-ended format allowed them to describe in some detail their own and their students' adjustment to online classes and the impact of the pandemic on their research and on them personally. A second survey, seeking Yes, Maybe/Considering, or No answers to a series of statements about the pandemic, was included in an evaluation questionnaire at the conclusion of ASEE's Annual Conference, held virtually from June 22 to June 26.

As the surveys were being prepared, a second national trauma occurred with the May 25, 2020 murder in Minneapolis of George Floyd. This latest killing of an unarmed African American by police, at a time when the pandemic was disproportionately affecting poor people and communities of color, sparked protests in towns and cities across the country. In academe, questions arose about institutional racism and barriers to access. These topics held a special relevance for engineering schools; many have struggled with only limited success to increase participation of minorities. In light of these conversations, ASEE developed another qualitative survey in early June asking respondents to reflect on their response to the Black Lives Matter and any plans or discussions at their institutions to address systemic and systematic racism on campus. As with the COVID-19 survey, open-ended responses were encouraged. Demographic information on respondents' job roles, gender, and race/ethnicity was also collected. The responses revealed a growing sense that engineering must participate in systemic efforts to remove racial and class disparities in higher education. In a reflection of the nation's deep cultural divisions, others found the whole discussion unnecessary and inappropriate.

This report is intended as an interim document, since ASEE plans to conduct additional surveys in the fall. The report highlights the major themes that arose around institutional operations, instructional impact, financial impact, personal well being and productivity, and the immediate impact on the workforce, as well antiracism efforts by the institutions.



INSTITUTIONAL OPERATIONS

Initially, many administrators responded quickly and worked with faculty directly to troubleshoot problems, and manage faculty and student expectations, including student employment. However, not everyone was satisfied with their university's response to the pandemic, and many of the positive reactions to the response to the pandemic qualified their thoughts with "considering the situation..." Commenting on how their leaders acted in March, many administrators, such as deans, department chairs, and center directors, had a positive view. Among the more detailed positive responses was this:

"We were being asked by our governor to be very conservative and followed his requests. Communication between our administration and the faculty preceded that with students so faculty felt positive about the entire process. Students were given a reasonable time to vacate their dorms, initially for a two-week period. Once the state declared a shelter-in-place policy, students were informed that they'd be completing the spring semester remotely. They were asked to return to campus for their belongings on a rotating basis to avoid violating social distancing models. Students who could not get back home easily were permitted to stay on campus, so exceptions were allowed which was the right way to handle things."

The views of faculty on the response of their institutions to the pandemic were much more mixed. These ranged from enthusiastic praise to vitriol. "Response was excellent," one said. "Our institution switched to online-only on March 11 and essentially allowed our city to be emptied of 45,000 people, just enabling social distancing automatically." Another seethed, "They were clueless. They were demanding. They lacked any understanding of anyone but the small group of staff who they had daily contact with. Their disdain of the faculty, already open and pervasive, became far worse."

The students tended to have more negative views on how their institution responded to the pandemic.

"I am pretty disappointed with how graduate students are being treated. Many had to purchase their own home equipment and many are not being cared for by their supervisors. If they have issues they're told to go to the student's association but their supervisors or departments have no direct responsibility."

However, another student cheered, ***"They did a great job."***

Respondents who believed their institutions fell short complained of both micromanagement and lack of support from leadership; increased administrative work; little help dealing with mental health problems; lack of physical access to resources; changing plans and work-from-home directives; and overworked IT departments. Some noted a seeming callousness in leadership communications, which one respondent attributed to concern about lawsuits.

One common complaint among respondents was the lack of clear communication by institution leadership. Respondents spoke about the timeliness and clarity—or lack of both—in institutional communications and preparedness; schools' recognition of the burdens placed on faculty and students; and whether actions taken were sufficient to meet immediate and longer-term needs.

Extra demands were placed on librarians. Librarians had to adapt to being able to provide extended services to faculty and students while they were also working from home.

"I led the library's efforts to work with faculty to ensure courses had materials and services needed. I attended meetings, prepared resources for faculty and worked one-on-one with them."

At other institutions, librarians stood up a new multi-channel chat service to provide rapid response to students and faculty, changed their web landing page to include information on remote learning support, used interlibrary loan channels to share articles and book chapters, and kept a small staff on site while making known how others working remotely could be contacted.

INSITUTIONAL OPERATIONS

As many respondents looked forward to the fall, they expressed uncertainty about plans, concern for fall enrollments, and anxiousness in their safety if the universities open for in person classes. One staff member, reflecting wariness about universities' ability to ensure safety, wondered what would happen when "tens of thousands of students" returned: "This endangers me, all employees, and the community where the university is located. It is extremely problematic." The university has ceased "even pretending to listen." A second staff member expressed frustration: "University is unable to make a decision and is unable to open. Still using home equipment since $ has dwindled and no resources are available to support staff working from home, even though the workload has increased."

As to whether concerns had eased, several respondents indicated otherwise. "It is getting worse," a faculty member reported. For others, uncertainty surrounding campus plans for the fall aggravated preparations for online teaching and the prospect of teaching some students in person and others virtually.

New concerns included an expected drop in enrollment, cutting revenue. An administrator's worries had shifted from "Let's finish the semester" to "Figure out how we don't go broke."

For some respondents, the pandemic served as a harsh reminder of longstanding problems in engineering education. One, revealed in the disparities in online teaching skills, was the lack of training in education provided by graduate schools. Another was engineering schools' heavy reliance on international students, including many from China, both as full-paying undergraduates and graduate-level researchers. "A large and long-lasting reduction in international student tuition will change the whole financial model for schools of engineering," an administrator warned. The shift to virtual learning also brought into sharp relief the "inequities in resources available to help students cope," an administrator said. As a result, engineering could lose "some of the scrappy, creative, talented 'bootstrappers'" who struggled to keep up.

ADMINISTRATORS

I am rethinking policies and procedures guiding course development for online instruction. **80% Agreed**

FACULTY

I was given adequate resources from my institution to transition to online teaching. **53% Agreed**

INSTRUCTIONAL IMPACT

FACULTY

I re-designed coursework for online instruction during the spring semester. **88% Agreed**

The quick transition online affected respondents differently based on their previous experiences with online instruction. While some faculty weathered the transition to online instruction well, other faculty felt unprepared and overwhelmed with the time-consuming tasks to move courses online, and students had the challenge of adapting to learning and communicating within their now online courses while at home. Immediate challenges were "how to teach remotely—lectures, labs, exams, and design projects," an administrator recalled, as well as how to run administrative functions. While one faculty member transitioned to Zoom with "nary a hiccup" and another reported a stress-free shift to online teaching, with "constant and consistent communication and explanations," certain courses tested faculty ingenuity. For example, one instructor had two weeks to move a hardware-intensive, industrial robotics course online. All face-to-face lectures were recorded for synchronous delivery. For a final project that ordinarily uses a large 6 degree-of-freedom robotic arm, the class made do with a virtual arm and controller. In a senior design course requiring specialized software only available in a computer lab, students were spread out to every other workstation, everyone wore masks, and surfaces were disinfected between classes.

Another instructor found the adjustment difficult, not being able to walk around the room, assess students' work, and answer questions. Freshmen, who usually asked questions in class, were hesitant to ask questions online. "Doing exams online was also difficult. All my exams had to be rewritten and input into Canvas." She heard many complaints from students about how much they hated working online.

Students, though, had difficulty adapting, particularly if they had not previously experienced virtual classes. "Students who watched recordings lost about 10 points on their test performances," possibly because they weren't as alert as in a live class, said one respondent. An administrator who also teaches stressed the importance of showing students how to learn well remotely. "Several students have issues which cannot be fathomed" and some faced challenges in staying connected. Maintaining a full credit load online means more work for students and requires greater discipline, according to an administrator.

Overwhelmingly, respondents considered the loss of lab-based, hands-on instruction to be the leading problem faced by engineering educators during the pandemic. Of 207 responses to ASEE's survey, approximately 120 included the terms "hands-on," "lab" or "laboratories," or both, and another 20 mentioned "team," referring to activities and projects. Certain topics, such as statics, dynamics, and circuits, can be taught online, but an engineering technology instructor cautioned:

"Simulating a casting process does not produce the understanding of doing a casting process."

A number of ASEE members agreed that connection with students had suffered, particularly with undergraduates, and wondered if they would be able to get to know incoming freshmen. "What I miss most, connection-wise, is the students who just knock on my door with questions," a faculty member wrote. Online communication with students in China will be difficult because of the time difference. Students also tend to ignore emails. Even if learning objectives can be met online, a faculty member lamented that students were missing out on out-of-class guidance on career planning, internship opportunities, and collaborating with local companies on research. Others missed the clues that come from facial expressions and verbal and non-verbal classroom cues.

INSTRUCTIONAL IMPACT

While some respondents complained of overflowing inboxes and video fatigue—"Zoomed out"—one found a silver lining in the diminished contact: "My department is not collegial, so this has actually been a healthy break from bad actors."

Various kinds of help were provided, including planning for online instruction; IT department help and training; set up of online library services; instructional training; and technology and lab equipment needed by students. Faculty used a variety of online tools and software to aid in instruction, such as Zoom, WebEx, Slack, Microsoft Teams, Blackboard, Canvas, and Google Meet. University IT departments were readily available to assist when needed, some institutions were able to provide students with needed equipment to participate in online courses, and many institutions offered trainings for faculty in online course instruction over the summer.

A faculty member praised her university's Center for Advanced Teaching and Learning through Research for making digital resiliency tools immediately available. When classes were moved online, she surveyed students to determine their locations and how well their Internet connections worked, and enlisted her "student council" of 2-3 students per section for feedback on how we should adapt her course for online learning, and relaxed course work requirements for the first two weeks. "I had daily drop-in virtual office hours that some students used and most students appreciated."

While there is concern about the potential costs to provide instruction in the fall and the potential need to change polices and procedures for student assessments, many institutions spent the summer working to prepare their departments and faculty for online instruction and hybrid instruction. One faculty member said, "Spending a week-long session in a teaching workshop with some other faculty has been the highlight of my past 12 weeks in quarantine."

Giving faculty, staff and students access to specialized engineering software can be costly. "We had to spend hundreds of thousands of dollars to do this," an administrator said. One school planned to equip classrooms with high-quality cameras and iPads so remote students would get nearly the same experience as those in the face-to-face setting.

A few respondents mentioned the concern for student cheating, particularly on problem-solving exams, conducted online, during which students can communicate by email and tap sources from the Web. Nonetheless, with no end in sight to the coronavirus and the likelihood of future pandemics, a few respondents said efforts to improve online instruction—including costly specialized software—were worthwhile. The experience of recent months was not wasted, an administrator noted:

"We have done more modeling that we normally would do, which is probably a good thing for broadening our perspectives."

FACULTY

I re-designed lab activities for online instruction during the spring semester. **67% Agreed**

FACULTY

I am rethinking my course designs and assessments for the fall semester. **88% Agreed**

RESEARCH OPERATIONS

Laboratory shutdowns presented a setback for graduate students and research generally. For lab-based teaching, one university quickly authorized Digilent Analog Discovery kits to be loaned to each student. At another institution, "many laboratory experiences had to be canceled." Lack of laboratory access remained a problem; some students had to accept incomplete grades for lab courses.

Among faculty, students and research staff, the most severely affected were those dependent on their institutions' research facilities, such as wet labs and high-performance computers, many of which were inaccessible for several months. One respondent succinctly summed up the status of numerous research projects: "Killed it." Labs began to reopen during the summer, but their use was limited at some institutions. One researcher "proposed plans for making it work solo/offsite" but claims not to have received a response. Lack of access to campus by graduate students "wreaked havoc on research," a respondent said.

Even where labs continued operating, their use in some cases was limited to urgent projects, such as COVID-19 research.

Other issues with research that arose due to the pandemic included canceled conferences, interruptions in human subjects research, delayed work on dissertations, and difficulty focusing on work. Canceled conferences meant either that they couldn't meet new people or—in the case of one respondent up for a promotion—couldn't present papers.

Research on human subjects was curtailed, including education research involving students. A principal investigator working with first-year students on an NSF Improving Undergraduate STEM Education grant found it difficult to continue remotely. A student researcher reported that "focus groups over Zoom instead of in-person simply didn't elicit the same quality of responses." Another researcher found that getting survey responses had become more difficult and decision making and collaboration were delayed.

A graduate student worried that a chosen dissertation topic had become unworkable, since it revolved around increasing student interaction and group work.

Some faculty members with teaching responsibilities put their research aside to concentrate on the shift to online learning. One respondent said, "My childcare obligations have gone up and I do not have the brain space for research."

RESEARCH OPERATIONS

Research budgets also faced issues. When one state governor ordered all agencies to cut spending by 20 percent, one researcher found it hard to receive payment for work already done. Another said doubt had been cast on project funding from the Defense Department because of budget uncertainty. Given upheaval caused by the pandemic, at least one faculty member had a fatalistic response:

"You're kidding right? My research is a mess. All of my funds were frozen for the summer and all summer student research was cancelled."

Some researchers were still able to function remotely, and others were able to pivot their research to focus on writing or to finding solutions to issues arising from the pandemic. Many researchers who were able to function remotely—including computer scientists requiring no more than a connected laptop and engineering education researchers doing statistical analysis—continued as normal or even found their productivity had increased.

Researchers saw "huge, unexpected benefits" in the quality and increased frequency of online research meetings allowing for deeper research, and those with overseas research partners already had practice connecting virtually. "We came up with a plan," an administrator wrote. "Morning group-ups via Zoom and quick email summaries at the end of the day. That strategy has worked for us and we are continuing it."

Work related to research, such as compiling results, writing papers and new proposals, occupied researchers and graduate students up to a point. But one researcher worried that when graduate students ran out of things to do while still getting paid, their grant would be used up before the project was complete.

Some researchers found alternative projects. One returned to writing a book and, with a collaborator, came up with a new concept— "something we never would have dreamed of" before the pandemic. A faculty member, lacking access to a lab or research partners in the same field, is instead developing a new flipped-classroom module and hopes it will yield publication-worthy results, remarking, "I'm pivoting as best as I can." An administrator reports, "We're working on some antimicrobial filtration media now, which was not something we were looking at before."

FACULTY

I had to fully or partially close my lab facilities. **66% Agreed**

STUDENTS

I had to change my research plans or how I conducted research. **59% Agreed**

Some engineering departments pivoted their research to address needs raised due to the pandemic, such as manufacturing personal protective equipment for medical workers and discovering engineering solutions to the crisis. Respondents mentioned other key challenges that may or may not be exclusive to engineering. One was the need for a greater variety of responses to the pandemic. At schools where projects were still possible, a number of students rushed to fill the gaps in personal protective equipment for frontline medical staff. Not all the resulting products turned out to be needed or even usable, but for some respondents, the effort reinforced the idea that engineers should address national problems and improve the human condition. "It is refreshing to realize how engineering researchers are addressing COVID-related challenges," one said. An administrator wondered, "How do we improve our response to large-scale immediate needs of healthcare equipment and delivery? Why are our medical personnel inadequately equipped at such drastic levels?"

Some respondents pondered specific engineering solutions to the crisis. A faculty member asked, "Can we create surfaces that are anti-microbial and be able to deploy them? Can engineering help with cleaning air? Can we design ways to move people around without spreading the disease and maybe find ways to detect the disease non-invasively?" Universities may need new structured-access protocols for laboratories, such as NASA's. More broadly, spaces might be redesigned to allow social distancing, and supply chains ought to become more resilient, respondents said.

FINANCIAL IMPACT

A number of respondents showed they were aware of the precarious financial position universities faced as a result of the shutdowns in the spring and loss of in-person instruction. One wondered if the effects would become so severe as to cause major changes in how universities operate. With income from summer programs cut and many students weighing whether to return to campus in the fall, some felt decisions about reopening campuses were being driven more by revenue than community health. An administrator expressed disappointment at "how governments are emphasizing revenues and sports over logical, reasoned scientific advice on reducing risk." New austerity measures meant some part-time faculty and staff had to be laid off. A researcher worried that a grant would be used up paying graduate students who couldn't access their laboratory.

Respondents noted the effort or lack of effort universities took in the spring to assist students and faculty with financial troubles due to the pandemic. One staff member credited her university with trying to help address students' financial as well as emotional needs as much as possible, but a faculty member lamented a lack of money to support students whose sources of income had disappeared with the pandemic. Other respondents were alert to the academic struggles of low-income students who had returned to crowded households without reliable Internet connections, some of them having to look for work because a parent was suddenly unemployed. A faculty member worried that online instruction was even more biased towards the well-resourced student. Underrepresented students appeared to be hit harder in terms of housing and financial security, with some abruptly removed from dorms without a place to go. Multiple students, faculty, and administrators reported having to spend their own money on equipment needed to set up online classes and work effectively at home.

ADMINISTRATORS

I purchased equipment with personal funds to work from home. **55% Agreed**

FACULTY

I purchased equipment with personal funds to work from home. **56% Agreed**

STUDENTS

I purchased equipment with personal funds to work from home. **47% Agreed**

As respondents looked toward the next academic year, there was concern that institutions would focus more on bringing in money than on health and safety. While praising the initial response to the coronavirus by her university's leadership, a faculty member commented, "Now that we are talking about the fall, I feel like we are prioritizing enrollment numbers and tuition over common sense and safety." Another speculated that the shift to online learning would reveal "a huge range of types of learners," whose needs the faculty will be expected to meet so as to maintain enrollment. Possible cuts in outside funding raised questions about the future of research. An administrator warned that "a large and long-lasting reduction in international student tuition will change the whole financial model for schools of engineering."

PERSONAL WELL-BEING & PRODUCTIVITY

Respondents described a range of effects—good and bad—on their health and work performance from months at home. Among close to 100 ASEE members who addressed these issues, some clearly adjusted well, reporting higher productivity, more exercise, and time for family and home projects. Others struggled with mental health challenges, anxiety, loneliness, a sense of isolation, child-care burdens, and despair, as well as equipment and communication problems. Several complained about a seeming lack of concern by university authorities

Faculty and students wrestled with inadequate equipment and bandwidth issues as they transitioned to working from home. Some mentioned issues of discomfort from ergonomically ill-suited chairs and desks. The pandemic affected work habits. "I have a difficult time concentrating on what seem like 'pointless' tasks related to work," a respondent said.

Work-life balance became much harder to manage during the pandemic. While some faculty members welcomed working at home and enjoyed the added time with spouses and children, one said productivity suffered. Marital stress became a "number one problem," with two working parents sharing childcare, a faculty member said. "Work/life balance became a disaster and there was no control over my life with two young children," a faculty member wrote, reflecting the adjustment a number of faculty had to make. A teaching assistant went "stir crazy" struggling to work, teach, and sleep in the same room.

Students also had to adjust to providing child-care, and other work/life balance issues. One student grieved the loss of her mother to COVID-19. Students also faced issues with internet connectivity and "fatiguing and tedious" video calls.

Mental health concerns increased due to the pandemic with respondents feeling emotional strain due to burn out and loneliness while working from home. Respondents noted a decrease in productivity over time as the feelings of burnout and loneliness really set it. An assistant dean reported:

"...concerns about my mental health have been very real, and very challenging for me and my family. . .. People in roles like mine were unfortunately expected to do all of that compressed and extra work with a smile on our faces and no complaints, which is a patently absurd expectation. My provost's and president's pep talks were demoralizing and condescending."

One staff member, deprived of the energizing effect of working around others, found working in solitude "draining and disheartening." Another felt "powerless and helpless in the face of this COVID epidemic and the epidemic of police violence and systemic racism. I struggle with tears every day and have trouble concentrating."

Many considered online connection an imperfect substitute for in-person contact. A staff member reported becoming "very anxious and worried," noting that it's very hard to stay connected via email and the Teams chat function helps just a tiny bit. A faculty member said the "lack of interaction with adults outside my home and constant interaction with my children has been difficult on my mental health."

A number of administrators and faculty members worried about how their students were faring. "Our check-in(s) were not good," an administrator wrote. "I could not tell what was going on with them mentally or academically." Another expressed concern for the "psyche/well-being of my students and collaborating colleagues."

A few respondents had different feelings about if their institutions provided adequate support for their well-being. A graduate student said, "my institution seemed to value research productivity over my well-being" and only adjusted its messaging "once the optics became untenable." An administrator who had been exposed to the coronavirus but lacked symptoms was denied a test at a university drive-through site. Another respondent felt supported:

"They encouraged us to step away from school periodically and take care of our families and our emotional needs."

Respondents also noted positive changes to their physical health due to working from home. An administrator said, "I actually lost weight due to healthier eating and more regular physical activity." Faculty encouraged their students to take time to exercise, find new hobbies, get outside, and socialize virtually with others in the department.

STUDENTS

It is difficult to remain engaged and motivated while working/studying from home. **61% Agreed**

IMMEDIATE IMPACT ON WORKFORCE

Faculty and staff were concerned about their job security. "Job security will definitely be an issue," one administrator wrote. Layoffs at one university shrank faculty by 15 percent—on the heels of an earlier, similar cut—and mandatory furloughs were contemplated. Information technology staffers were offered early retirement. Elsewhere, non-tenured line faculty were uncertain if they would have jobs, and an administrator wrestled with what kind of assignments would keep direct reports employed.

Students have become increasingly concerned about internship availability, the potential to meet professional engineers and the availability of jobs once they complete their degree. A graduate student, no longer able to defend a thesis as expected, delayed graduation from summer to fall, but noted that academic job prospects had already dried up. Another decided to wait another year before graduating, hoping the job outlook would improve. The shift from in-person to online learning prompted one respondent to express concern about "non-class topics that don't get addressed," including career planning, internship opportunities, research collaboration with companies, and student connections with local industry leaders. One student worried about the lack of chances to learn to see themselves as an engineering noting that a lot of engineers' development occurs on the job, "walking to another engineer's desk to ask a quick question or simply talking something out over the cubicle wall."

However, the pandemic may have provided an opportunity for students to gain new skills that will be useful when entering the workforce. One respondent said, "In the long run I think the students will benefit from having to self-motivate their own education for a while. It was closer to what life will be like in the working world in some ways."

ADMINISTRATORS

The college or department is experiencing staff turnover issues due to the pandemic.
17% Agreed

FACULTY

I am worried about my job security.
32% Agreed

STUDENTS

I am concerned about the job market due to the pandemic.
78% Agreed

ANTI-RACISM EFFORTS

This survey on university anti-racism efforts elicited strong emotions from the respondents. Many respondents expressed strong desires to see change on campus and within their departments, even if they were not sure what that change should look like. They appreciated the opportunity to respond to the survey and share their feelings and concerns about racism issues at their institution, as well as share their ideas to combat those issues.

While a few respondents found discussion of systemic racism inappropriate, this section will focus on immediate and future ideas raised by the overwhelming majority of respondents to address racism on their campuses.

Respondents shared immediate campus responses to the civil discourse on racism due to the increase in Black Lives Matter protests. A number of institutions issued statements or emailed messages to their communities deploring Floyd's murder and affirming that Black Lives Matter (BLM). Fewer appeared to have taken concrete steps or altered policies. As one respondent noted, "since everyone is still banned from campus, there has been nothing beyond announcements." More often, follow-up action was taken at the departmental level or engineering school level or by ad hoc groups and individuals.

Some of these actions included:

- Faculty member hosting weekly racial justice training for other faculty and students.
- A coalition of institutions, sponsored by the Association of American Colleges and Universities, created Truth and Racial Healing and Transformation Centers committed to "prepare the next generation of strategic leaders and thinkers to break down racial hierarchies and dismantle the belief in the hierarchy of human value."
- A reevaluation of the effects of high-stakes examinations on underrepresented minority students, leading to a "redesign of testing strategies to lower effects of stereotype threat in students' performance."
- Holding webinars and town halls within an engineering school with over 600 attendees.

Among group and individual steps being taken, "a small group of leaders" at one institution reached out to professional colleagues and began identifying actions "to take a stand and take action." The editor of a STEM education journal was "now requiring positionality statements from authors and a section on how the researchers protected vulnerable populations."

Reflecting on her efforts to promote diversity in the classroom, one faculty member was moved to do more as a citizen.

"For nearly twenty years I have dedicated three sessions of my intro class to working on diverse teams, including activities led by our campus diversity and inclusion organization; I will continue this." "Personally, I have increased my regular monthly donation to the Southern Poverty Law Center. I will continue supporting a child immigrant program, and I will start supporting a state program on economic and social justice."

Respondents shared planned campus responses and conversations to the civil discourse on racism due to the increase in Black Lives Matter protests. The George Floyd killing and subsequent unrest prompted or coincided with various personnel moves to elevate diversity, equity, and inclusion (DEI) as a priority on a number of campuses. One university adopted as a goal "to be a leader in diversity and inclusion" and initiated seven steps, including recruitment of more promising students of color, anti-racist training, and efforts to sensitize White students to the privilege they enjoy. Another school created a new position of vice president for diversity; a third had already set up a DEI task force; and a fourth had a new director of equity. Two engineering schools added DEI specialists, and a third plans to conduct leadership training with an anti-racism expert. Another school expanded the scope of an existing diversity office, which had mostly worked to improve conditions for women, to deal with concerns of people of color. A Latinx task force began to work with other student groups. Some schools discussed or planned removal of names on buildings associated with slavery or racism.

ANTI-RACISM EFFORTS

One university adopted as a goal "to be a leader in diversity and inclusion," among six other steps. There, and at other schools, steps were under way to increase diversity among undergraduate and graduate students and faculty and to broaden participation in an engineering research center. One department discussed dropping its graduate record exam requirement, seen to result in inequitable admissions. Another school planned to start a "disparate impact analysis" of technical decisions, presumably around employment or admissions. An administrator reported, "We will reach out to regional community colleges and HBCUs to facilitate transfer and success in our engineering programs." Although the absence of students from many campuses necessarily curtailed conversations on racial equity, more forums and webinars were expected, along with anti-racism training, and efforts to sensitize White students to the privilege they enjoy. Relations with local police were getting more scrutiny. A faculty member at a major HBCU noted that while the Criminal Justice and Journalism departments had been at the forefront of a local social justice movement, "we may see more activity and action from the student engineering societies this fall."

METHODOLOGY

COVID Stories and Racial Activism Qualitative Surveys

The qualitative survey was developed in late May 2020. The survey consisted of 7 open-answer questions asking respondents to reflect on their experiences and life/work changes that occurred due to the COVID-19 pandemic; their ability to remain connected for work; the response of their institutions' leadership to the pandemic; any changes to research; how the pandemic has affected the engineering community; and their institution's plan for the fall semester. Demographic information on respondents' job roles, gender, and race/ethnicity were also collected.

While the survey was in development, racial activism and protest increased due to the killings of George Floyd and Breonna Taylor by police. We felt this massive social response, occurring during the pandemic, needed to also be represented in any analysis of the experiences of the engineering community. A second qualitative survey was developed in early June asking respondents to reflect on their and their institution' response to the Black Lives Matter protests, as well as any plans or discussions for future action at their institution to respond to systemic and systematic racism on campus. Demographic information on respondents' job roles, gender, and race/ethnicity were also collected.

Both surveys were sent to all ASEE members on June 16, 2020 via email. The surveys remained open until July 13, 2020. Beyond the initial email, both surveys were promoted through social media posts, ASEE's daily newsletter emails, and discussions during relevant sessions at ASEE's 2020 Virtual Conference.

Those questions were organized into major themes of instruction impact; research operations, financial impact, civic activism, personal well being and productivity, workforce issues, and institutional operations. The responses to the COVID-19 survey were reviewed for common elements raised within each of these major themes. Additional observations were noted based on the survey responses.

ASEE Annual Meeting Evaluation COVID-19 Questions:

Multiple sessions during the ASEE 2020 Virtual Meeting, held from June 22-26, 2020, were focused on discussing how engineering higher education programs responded to the COVID-19 pandemic. Based on themes raised in these discussions, a series of statements targeted at administrators, faculty, and students were developed to be added to the meeting evaluation survey. Respondents were asked to respond to the statements of experiences with Yes, Maybe/Considering, or No based on their experience with COVID-19. The survey opened June 26, 2020 and closed July 15, 2020. The survey was sent out via email to all attendees of the ASEE 2020 Virtual Meeting. Respondents were only asked to identify their role and not their race/ethnicity or gender for this survey.

DEMOGRAPHICS OF SURVEY RESPONDENTS

COVID Stories Data

***207 individuals responded to the COVID-19 survey.**

JOB ROLE		
Administrator	67	32%
Faculty	121	58%
Staff	10	5%
Student	18	9%
Other	14	7%

GENDER		
Male	100	48%
Female	92	44%
Non-Binary	3	1%
Prefer to Not Answer	11	5%
Other	1	0%

RACE/ETHNICITY		
Asian	14	7%
Black/African American	13	6%
Caucasion/White	150	72%
Hispanic/Latinx	12	6%
Multiracial	5	2%
Native American/Native Alaskan	1	0%
Prefer not to Answer	12	6%

COVID-19 Annual Meeting

JOB ROLE		
Administrator	93	15%
Faculty	443	71%
Student	88	14%

DEMOGRAPHICS OF SURVEY RESPONDENTS

Anti-Racism Surveys

***246 individuals responded to the COVID-19 survey.**

JOB ROLE		
Administrator	92	37%
Faculty	155	63%
Staff	15	6%
Student	15	6%
Other	30	12%

GENDER		
Male	116	47%
Female	105	43%
Non-Binary	4	2%
Prefer to Not Answer	18	7%
Other	3	1%

RACE/ETHNICITY		
Asian	15	6%
Black/African American	25	10%
Caucasion/White	170	69%
Hispanic/Latinx	30	4%
Multiracial	2	1%
Native American/Native Alaskan	3	1%
Prefer not to Answer	21	9%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