

# BIG PICTURE

FALL 2020

The View from Lewis College

## Cooking Up a Bright Future in Food Science

COVID-19 Response:  
Lewis College Steps Up

Investigating  
Virtual Assistants



**ILLINOIS TECH**

Lewis College of Science and Letters

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SCIENCE AND LETTERS**

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*Informing the future: New worlds  
of possibility at the intersection of science,  
humanity, and technology*

Lewis College of Science and Letters was formed on June 1, 2020, and houses the departments of Biology, Chemistry, Food Science and Nutrition, Humanities, Physics, Psychology, and Social Sciences.

Illinois Institute of Technology, also known as Illinois Tech, is a private, technology-focused research university offering undergraduate and graduate degrees in engineering, science, architecture, business, design, human sciences, applied technology, and law.



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### Welcome to Lewis College of Science and Letters!

Our new college was formed by joining seven departments: biology, chemistry, food science and nutrition, humanities, physics, psychology, and social sciences. The college also hosts the English Language Program, which provides services to our international students. This college name is not new. It was first used in 1975 to recognize the legacy of Allen Cleveland Lewis, the founder of Lewis Institute, which opened in 1896. Nearly 50 years later, in 1940, Lewis Institute joined Armour Institute to create what we now call Illinois Institute of Technology.

Combined, our departments have more than 250 undergraduates and more than 450 graduate students. Graduates of our bachelor's programs regularly go on to prestigious graduate programs and employment in business and civic organizations. Graduate students in our programs are actively involved in research, win awards, and receive grants. I am proud to be leading this new constellation of departments as Illinois Tech continues to offer a distinctive and relevant education to all of our students.

This year has been challenging for all of us. The COVID-19 pandemic caused the university to close campus in March, and we began teaching all courses remotely before moving into a hybrid model this fall. The faculty rose to the challenge of quickly adapting to the new environment and were creative in developing ways to offer laboratory courses, lectures, and course discussions online. Likewise, students had to adapt to new methods of instruction including new learning platforms, all while facing the social isolation of leaving their friends, roommates, and activities behind. It is difficult to say when things will return to "normal," but we have learned many lessons from this crisis that we can take with us as we move forward.

During this time we continue to advance our research mission as well. In this issue of *Big Picture* we highlight some of the many accomplishments of our students, faculty, and alumni. You will learn how Assistant Professor of Biology Oscar Juarez and a group of undergraduate students are contributing to the knowledge of testing and treatment for COVID-19, how we interact with Alexa and Siri, and how we can use games for workplace training, while in our cover story, alumna Gina Oberoi (BCHM, M.S. FST '18) shares how a single elective course in nutrition profoundly shaped her career. These stories and more highlight the breadth of topics in our new college and the success of our graduates. I hope this provides you with a taste of the many activities taking place in Lewis College.

**Christine L. Himes**  
Dean, Lewis College of Science and Letters

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# ILLINOIS TECH

Lewis College of Science and Letters



## ON THE COVER

*Gina Oberoi (BCHM, M.S. FST '18) poses in uniform in the Department of Food Science and Nutrition's metabolic test kitchen at Illinois Institute of Technology. As a food technologist at Vanee Foods Company, Oberoi researches and develops new food products for use in chain restaurants and foodservice. Photo: Olivia Dimmer*

# LEWIS COLLEGE NEWS

## CHEMISTRY, BUT MAKE IT GREEN

New research underway in Assistant Professor of Chemistry **Jean-Luc Ayitou's** AJA Laboratory explores the feasibility of using water as a solvent, a "green chemistry" project that, if adopted in industrial settings, could have a positive impact on the environment.



Jean-Luc Ayitou

**Will Blodgett** (CHEM, CHE, M.S. CHEM 4th Year), a chemistry and chemical engineering double-major who is enrolled in the accelerated master's degree program in chemistry, is leading the project. As Ayitou describes it, green chemistry protocols "aim at mimicking Mother Nature with an emphasis on reducing chemical wastes downstream."

Blodgett spent two years preparing for the biphasic

project with support from his lab partner, Alysia DeSimone (CHE, M.S. ENVE 4th Year). Their initial testing with milliliter scales was "very promising," Ayitou says. This fall Blodgett has begun testing large-scale reactions to using water as a solvent in order to gauge the feasibility of following the same protocol in industry settings.

"Water cannot be used to dissolve many organic compounds, leading many industries to use large amounts of organic solvents, which are more harmful to the environment," Blodgett says. "With the addition of phase transfer nanocavities in water, we are able to use a much smaller amount of organic solvent."

Ayitou says he is confident the biphasic reaction technique will prove viable alongside other green chemical synthetic processes.

"We hope to integrate this new approach with existing green chemistry techniques to raise awareness for environmentally benign synthetic protocols," Ayitou says. "These can be implemented in the industry in order to minimize the use of toxic reagent or to reduce toxic waste."



Will Blodgett

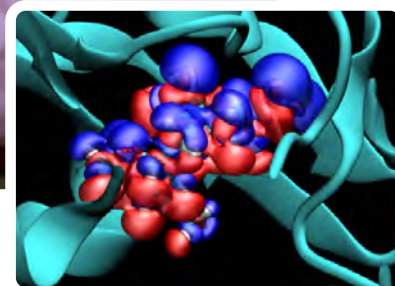
## CHEMISTRY'S DAVID MINH LAUNCHES MACHINE LEARNING RESEARCH THROUGH NEW CHAIR POSITION

Associate Professor of Chemistry **David Minh** has been named the inaugural Robert E. Frey Jr. Endowed Chair in Chemistry, a five-year position that will enable Minh to expand his computational chemistry research in a new direction—by applying machine learning to chemistry.

The creation of the chair position is the result of a donation from Frey (CHEM '65), an alumnus whose contributions in support of the university also include funding the remodeling of the Department of Chemistry's office suite in recent years. Among its benefits, the new chair position offers Minh \$40,000 per year in research funding, which he says will primarily pay the salary of a research scientist to help support his new project.

Minh says he is excited to now explore machine learning, a process that is increasingly being applied in chemistry research and utilizes data to inform predictions.

"I am aware of work in which machine learning has been used to predict the products of a chemical reaction; reaction conditions—such as solvents, catalysts, and temperature—that optimize the yield of a reaction; quantum mechanical ground-state energies; and binding affinities of protein-ligand complexes," he says. "I would like to predict how small organic molecules are polarized when binding to proteins. This could affect how tightly they bind and whether a molecule could be a drug."



## STUDYING THE LINK BETWEEN EATING DISORDERS AND MENTAL HEALTH

**Elizabeth Dougherty's** research on eating disorders is getting noticed. The clinical psychology Ph.D. student saw her work recognized this year through a Rising Star Award from the UC San Diego Eating Disorder Center for Treatment and Research, as well as with a student research grant from the Academy of Eating Disorders and a Student Research Award honorable mention from the Association of Psychological Science.

The student research grant provided funding for Dougherty's dissertation research into a subject she feels is critical to explore: the connection between eating disorders and mental illness.

"Eating disorders are highly co-morbid with other psychiatric conditions," Dougherty says. "Witnessing this in my own clinical work made me curious



about what accounts for this. This motivated me to conduct research to identify shared risk factors for eating disorders and other psychiatric disorders, such as anxiety disorders. This information may inform the development of effective transdiagnostic treatments for eating disorders and co-morbid conditions."

Dougherty's dissertation study is now underway with a clinical sample of women who are participating remotely. The study is specifically looking into whether stress leads to increased bulimic behaviors.

"A considerable portion of individuals with eating disorders do not recover from these conditions, despite receiving our best empirically supported treatments," Dougherty says. "Given the elevated risk of mortality associated with these conditions, it is crucial that we find ways to improve treatment."

## EMBRACING LEADERSHIP, EMPOWERING OTHERS

**Ursula Hersh** (CECD, M.P.A. 3rd Year) is coming into her own in the realm of public service. The Camras scholar, now enrolled in the dual Bachelor of Science in Social and Economic Development Policy/ Master of Public Administration program, completed an internship with the Chicago Commission on Human Relations in fall 2019 and is now taking action on campus as a member of the Student Government Association at Illinois Institute of Technology and founder of a new campus organization, the Female Empowerment Movement (FEM).

Hersh says she joined the SGA this fall with the goal of advocating for student needs during the pandemic.

"We are currently working on several projects, including the revitalization of the U-Farm [campus community garden] on campus, a peer mentorship program, and the reestablishment of a women's center," Hersh says. "I have been able to work between SGA and FEM to pursue projects that I think are

really important."

Hersh launched FEM after recognizing an opportunity to provide additional support to female-identifying students. The group's meetings are focused on issues including sex education (especially consent), body issues, relationships with oneself and others, the campus environment, and sexism.




"It's sometimes easy to feel isolated or struggle to develop female camaraderie in a school as intensely male-dominated as Illinois Tech," Hersh says. "I wanted to establish a group to help ensure that women know they have peers they can reach out to who have shared their experiences, and to generate increased opportunities and resources for women on campus."

Though she hasn't pinpointed the exact career path she wants to take yet, Hersh says she is committed to public service and helping those who are less fortunate as a result of broad, systemic problems.

"While it sometimes feels impossible to approach things at a national scale, local governments and organizations can make big differences in their communities," she says. "I am really interested in policymaking and fighting for social justice. I would like to help fairly redistribute resources and support disenfranchised populations."

# COOKING UP A BRIGHT FUTURE IN FOOD SCIENCE

by Linsey Maughan



**When a passion calls, you answer.** Such was the case for **Gina Oberoi** (BCHM, M.S. FST '18), who found her love of food science by chance—through exploration as an undergraduate student at Illinois Institute of Technology. Oberoi launched her career in the food industry in May 2018, the same month she graduated from Illinois Tech with a B.S. in biochemistry and M.A.S. in food safety and technology.

“When I first began as a student, I knew I wanted to pursue a science-based degree, but I did not know exactly what career path I wanted to take,” she says. “I enjoyed biology and chemistry, but it was not until I took an elective nutrition course for my biochemistry major that I even knew what food science was. Not all schools offer food science programs, so I feel very lucky to have discovered it at Illinois Tech.”

While taking the nutrition course, Oberoi says the realization that food deeply influences our lives compelled her to consider a career in food science.

“Not only is food important for our health and survival,

but we also have an emotional connection to food,” Oberoi says. “Sharing a meal with friends or family is often an experience in itself. Everyone needs to eat in the world, and we all rely on the food supply chain to deliver food that is safe, affordable, and tasty to eat. The course made it easy for me to see the direct impact that I could have on people through food. Ultimately, I ended up taking a career path in food as it is studied outside of the human body, but nutrition is really what initially sparked my interest in food science as a whole.”

Oberoi, who lives in Chicago, entered the food industry as an applications technologist at Brookside Flavors and Ingredients in Addison, Illinois, where she worked

## SWEET NEWS FOR STRAWBERRY LOVERS

with flavor applications—“trying out flavors in different food items to study how the flavor functioned,” she says. She has since moved on to a position as a food technologist at Vanee Foods Company, a Berkeley, Illinois-based manufacturer of bottled sauces, canned goods, dry mixes, and soup bases, many of which are used in chain restaurants and foodservice.

“I decided I wanted to develop complete finished products,” Oberoi says. “I work on our research and development team formulating new products, bringing them from small benchtop samples to large-scale commercialization.”

Oberoi says she does not consider herself a chef, but she does enjoy trying out new recipes at home in her own kitchen and utilizes her food science background to inform her cooking processes.

“I have a couple of food science cookbooks that I like to reference,” she says. “Knowing the science behind food, such as why a marinade tenderizes meat or how starch thickens up a sauce, helps me to make tastier food at home. Having that background knowledge gives me an idea of what will work in the kitchen and what will not.”

Since becoming a food scientist, Oberoi has found others are very interested in learning more about the foods they eat, and she is frequently approached with questions.

“I get questions from my friends and family all the time along the lines of, ‘Why do they have to put all of these ingredients in here?’ or ‘Is organic food really better for you?’” she says. “Some of the biggest food trends these days are all about ‘clean-label’ and ‘less processed.’ I think the food industry does a great job of telling consumers what is in our food products, through clear product labeling, but does not necessarily explain why

certain types of ingredients are used.”

Oberoi says the lack of information can cause fear or confusion in consumers. She finds that people are interested in learning how foods are made, but they don’t know where to find reliable information.

“I feel it is my duty as a scientist to help teach others about the food that they are eating and instill a bit more trust in the food industry,” Oberoi says. “There are a lot of food myths out there, and the science is always evolving.”

When asked what she aspires to achieve in the long term, Oberoi says consumer demands are forever changing, and for now she is committed to continued learning as a food scientist.

“I’m excited for the day when I’ll be able to develop a completely new and innovative product that no one has seen before from scratch, bring it up to commercialization, and be able to see it on consumer plates,” she says. “Eventually in my career, I could see myself moving into upper management and/or managing my own team of scientists. I also really enjoy educating people about food science when I can, so it’s possible I could go down that sort of path later on as well. I think it would be great to have a general food science course incorporated in more school curriculums in the future to give people a greater understanding about what they are consuming on an everyday basis. Who knows—maybe one day I will be a part of that.”



A study led by faculty and alumni of the Department of Food Science and Nutrition suggests that regular consumption of strawberries could provide a number of gut cardio-metabolic benefits.

Study participants were assigned a beverage to consume for a four-week period. Some received a drink made with real strawberries, while others were provided a placebo drink featuring the same taste, color, calories, and sugar content as the real strawberry drink, but without actual strawberries in it. Participants could not tell the difference between the two drinks and drank their assigned beverage twice per day for four weeks, took a four-week break, and then spent four weeks consuming the opposite drink. Blood samples were taken and tested before and after the four-week interventions.

The researchers found that regular strawberry intake reduced concentrations of certain secondary bile acids in study participants compared with the levels of the participants who consumed only the placebo beverage. **Britt Burton-Freeman**, a professor of food science and nutrition, chair of the department, and principal investigator on the study, says the reduction in secondary bile acids could lead to a number of health benefits warranting follow-up research.

“Based on the changes, we would hypothesize reduced colonic inflammation, reduced gut permeability, metabolic influences, and a healthier gut microbial community,” Burton-Freeman says.



## PHYSICS ALUMNA LENDs EXPERTISE TO INTERNATIONAL VENTILATOR PROJECT



As a research associate at Fermilab, **Tanaz Mohayai** (Ph.D. PHYS '18) has been busy researching neutrinos, which she describes as the “most abundant, yet most elusive, elementary particles.” This year, though, the nature of her research made her a prime candidate to volunteer for an international project born of the pandemic: the development of a new lung ventilation system for COVID-19 patients.

Per its website, the Mechanical Ventilator Milano (MVM) project began “in the international research project The Global Argon Dark Matter Collaboration (GADM), which supports researchers looking for dark matter, an invisible component of the universe.” The website adds that this research involves working with gas handling systems and complex control systems, “the same capabilities required in hospital ventilators.” The project is led by Cristiano Galbiati, a professor of particle astrophysics at Gran Sasso Science Institute and a professor of physics at Princeton University, who Mohayai previously worked with while completing a post-graduate research assistantship at Princeton. Galbiati is the spokesperson for GADM and brought in collaborators for the ventilator project from Europe, Canada, and the United States. When Galbiati contacted Mohayai, she didn't hesitate to step up—her work at Fermilab

was a strong match for the project.

“[At Fermilab], I work on sensitive gas detectors that magnify the points of interactions of neutrinos with a gas medium,” Mohayai says. “We need a precise control of the pressure and flow of the supplied gas. MVM operates in pressure controlled and support modes; as with our gas detectors, we need precise control over the pressure and flow of the medical air or oxygen that the lungs receive. The stakes, however, are exceedingly higher, so a constant communication with the medical community and close collaboration with engineering and manufacturing experts have been a must.”

Mohayai has helped to develop MVM's user manual and has communicated at length with medical professionals to ensure the correct terminology is used. She is also contributing to a paper the group aims to publish and has helped

with certification documentation. She is one of approximately 300 volunteers collaborating mostly remotely on the project via Zoom.

MVM was recently authorized by Health Canada under an interim order and has also been approved by the U.S. Food and Drug Administration for emergency use during the pandemic, while its certification is in progress within the European Union. The ventilator has a simple and cost-effective design, Mohayai says, and the group is now working with companies and manufacturers that are certified electro-medical device builders to produce them on large scales.

“In the end, the medical professionals on the frontlines are the ones who make use of these medical devices to provide care to the patients,” Mohayai says. “I am just humbled for the opportunity to play a small part in this.”



## UNDERGRADUATES PURSUE PATENT, GRANT FUNDING FOR COVID-19 RESEARCH

Students from Associate Professor of Biology **Oscar Juarez's** summer Elevate course, SCI-497 and SCI-498: COVID-19 Testing and Treatment Strategies, are pursuing the projects they proposed in the course in hopes that their work might see real-world use.

The eight students were split into two groups—one focused on developing a new testing method for COVID-19, and the other on proposing a new treatment method for the virus.

“These are actually really interesting ideas,” says Juarez, who continues to advise the students on their research. “They presented their projects in our biology colloquium and all of the faculty were really impressed.”



Oscar Juarez

The group focused on COVID-19 treatment is developing a grant proposal in hopes of securing funding for continued research.

“We became interested in finding a method to alleviate the cytokine storm, which is an immune response that can lead to some of the severe COVID-19 symptoms,” says **Hannah Aagaard** (AMAT 3rd Year). “Our team learned about a natural substance



Amna Haneef

that has shown promising results in potentially reducing inflammation and has a chemical structure that allows binding to the spike protein in the SARS-COV-2 virus. We are looking for compounds that can be good candidates for enabling bodies to resist the effects of the SARS-COV-2 virus.”

The group focused on testing is working to develop a portable breathalyzer that can test for COVID-19 and send test results directly to a person’s mobile device. Juarez says the key is using molecularly imprinted polymers to specifically detect COVID-19. The group is looking into filing a patent, which would enable it to produce the portable breathalyzer itself or sell the product to a large company.

**Amna Haneef** (BCHM 3rd Year), a member of the team working on the breathalyzer project, says she is proud to be doing work that addresses the pandemic.

“As a team, we wanted to contribute something to the community by learning about the virus and spreading awareness about it,” Haneef says. “I am excited to be a part of this project and help in some way to fight against this disease.”

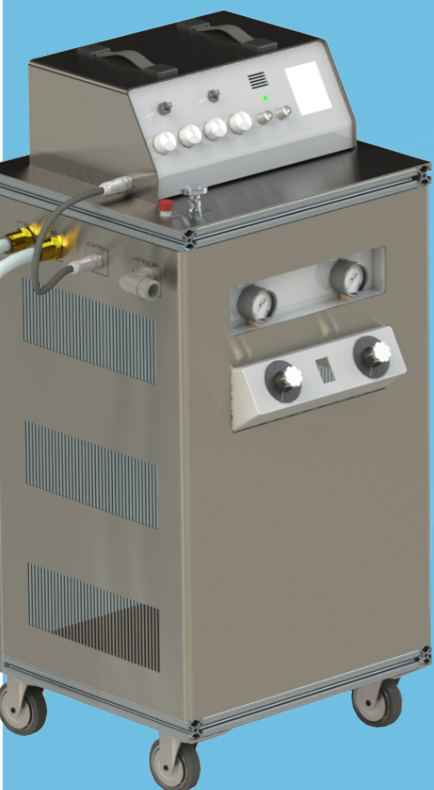
## DISRUPTING THE VENTILATOR INDUSTRY

A local startup co-founded by Illinois Institute of Technology Professor of Physics **Carlo Segre**, Research Associate Professor of Chemistry **Elena Timofeeva**, and two-time physics alumnus **John Katsoudas** (PHYS '97, M.S. '04) has been awarded a contract with the United States Department of Defense to produce low-cost ventilators in response to the COVID-19 pandemic. The startup, called Influit Energy and founded in 2014, develops flow batteries made with nanofluids. Katsoudas serves as chief executive officer; Segre is the chief technology officer; and Timofeeva serves as chief operation officer and director of research.

The ventilator concept was developed by Katsoudas this past spring. He submitted his design to a hackathon hosted by mHUB, a Chicago-based incubator that exists to support local makers and startups. Katsoudas then began assembling a team of technical experts to move the project forward regardless of the competition’s outcome. After winning first place in the hackathon, Katsoudas and 20-plus volunteers spent three weeks assembling a benchtop prototype. The ventilator design is open-source and license-free, making it is easy to reproduce at a far lower cost than market models. The parts needed to build the ventilator are widely accessible.

After completing the prototype, Katsoudas submitted the design to a Department of Defense solicitation to develop ventilators and was recently awarded a \$1.7 million contract to fund the design’s refinement and commercialization. The contract will begin on December 1, 2020.

“After the mass-producible device and its quality-management systems are mapped out, the first five ventilators will be submitted for testing by month 10 of the project, and the entire value supply chain will be Food and Drug Administration approved within a year,” Katsoudas says. “I hope this design will be sufficiently low cost to disrupt the existing supply chains and force a change on how these critical medical devices are made available to lower-income communities and the developing world.”



# GAMIFICATION OF LEARNING

Incorporating elements of gaming into learning environments and workplaces is proving not just trendy, but also effective in producing positive learning outcomes. Assistant Professor of Psychology Kristina Bauer has been studying “gamification,” or the application of gaming elements in non-game contexts, for several years. This fall she co-authored two new studies on gamification with industrial-organizational psychology Ph.D. students Danny Gandara and Caribay Garcia-Marquez.

One of the new publications is a book chapter, “Teaching with Games and Gamification: Best Practices and Future Research Needs,” which appears in the *Handbook of Teaching with Technology in Management, Leadership, and Business*, published by Edward Elgar Publishing.

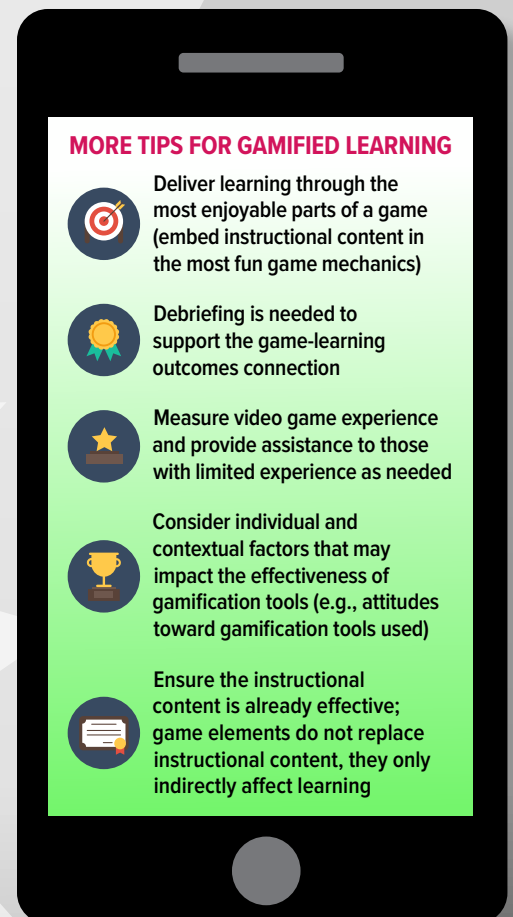
Among the researchers’ recommendations, Bauer says students learn best when they are active participants, and feedback is needed to support motivation and learning. Challenges in a game should be matched to the students’ competence level, and

teachers should work to ensure they understand the interest, engagement, and confidence levels of their students, as these factors shape learning experiences.

The second collaborative paper, “An Examination and Extension of the Theory of Gamified Learning: The Moderating Role of Goal Orientation,” was published in *Simulation and Gaming* and culled from Garcia-Marquez’s thesis, with Bauer co-authoring. This study found evidence suggesting that receiving virtual badges within a learning context could help motivate individuals who otherwise tend

to avoid situations where they fear they may demonstrate incompetence.

“The fact that badges can increase learning self-efficacy (i.e., confidence in being able to learn) for these folks is good because we know that learning self-efficacy is positively related to learning,” Bauer says. “We also think the finding demonstrates how individual differences play a role in learners’ responses to game attributes in a gamified learning experience, which suggests designers should take these individual differences into account.”



## TEACHING THE TEACHERS STEM PROFESSORS OFFER WORKSHOPS FOR CPS GRADE SCHOOL TEACHERS



Andy Howard

This past summer Illinois Institute of Technology faculty and graduate students in physics, biology, and chemistry, along with those in civil engineering, paired up with colleagues at National Lewis University and the Academy for Urban School Leadership to help Chicago Public Schools grade school teachers learn new ways to teach STEM subjects to their students.

The collaboration, titled the Illinois Tech and National Louis University Summer Institute for Science, Technology, and Engineering Practices (IN-STEP 2020), provided a virtual opportunity for grade school teachers to be exposed to the real work of scientists and engineers at Illinois Tech, and gave teachers tips for converting those experiences into lesson plans.

Associate Professor of Biology and Physics **Andy Howard** coordinated Illinois Tech's involvement in the partnership and led a module titled "Proteins and Illicit Drugs" alongside **Jeff Wereszczynski**, an associate professor of physics. The other sessions that were offered looked at topics including the relationship between food production and climate change, density, and earthquake hazard mitigation.

"I would say almost all of the participants really did benefit, not only because they learned some basic science and engineering from us, but also because the NLU people—and, to lesser extent, the Illinois Tech people—provided them with raw materials that they could use to develop multi-week units in their own classrooms," Howard says. "Many teachers despair of acquiring good-quality unit materials, and IN-STEP provided those."

The institute was provided free of charge, and the teachers each received a modest stipend for attending in addition to receiving professional development credits. It was funded by a United States Department of Education Teacher Quality Partnership Grant received by National Louis University, which brought in Illinois Tech as a subcontractor.

## RETHINKING LEARNING ENVIRONMENTS IN THE AGE OF COVID-19

Professor of Sociology **Ullica Segerstrale** has been immersed in the study of learning environments in recent years, presenting and publishing in this area in addition to engaging students on the subject of space through her teaching. She defines learning environments as having to do with "aspects of teaching and learning as well as aspects of the physical space in which this happens."

"I see myself as involved in an ongoing learning experiment, doing research as I am teaching and reflecting on the students' responses," Segerstrale says.

The global pandemic has reshaped learning environments, including on the Illinois Institute of Technology campuses. Both of Segerstrale's fall courses, for example, are being taught online.

"Now the concern has shifted to dealing with the COVID-19 crisis, and this, if anything, is a question about space," Segerstrale says. "Some of the

new physical arrangements for in-person teaching will probably create a somewhat unusual classroom atmosphere, making some teachers work harder to 'keep the class together.' We will know later how this actually worked out in practice and for what type of classes. Of course, for teachers who mainly lecture to a class, and for students who are used to just listening to teachers, it might not make much of a difference."

Segerstrale says she finds that online courses offer some "unexpected benefits" that actually suit students quite well.

"Many of our students are self-motivated and professionally oriented, and can manage their time effectively," she says. "I still think it is best to have a scheduled online class (rather than totally asynchronous teaching), for the 'class sense' of it all and for students to not have to over-manage their own time. I also see a new type of relationship evolving between teacher and students



during online teaching; it can be seen as a mass individual tutorial of sorts, at the same time as it can be a discussion-oriented class."

Still, students' participation in online classroom discussions varies; not everyone is eager to turn on their camera.

"Some students seem happy to become just 'voices,'" Segerstrale says, "although I usually ask them to show themselves when they speak."

# UNCOVERING ACCENT BIASES IN SIRI AND ALEXA



**Halcyon Lawrence** (M.S. TCID '10, Ph.D. TCOM '13) is utilizing the technical communication expertise she honed at Illinois Institute of Technology to inform her latest research and teaching at Towson University, where she now works as an assistant professor of technical communication and information design.

“I have been able to expand my dissertation research on speech intelligibility, chaired by Matt Bauer in humanities, to continue using a linguistic framework to examine the phenomenon of coded bias in speech devices like Siri and Alexa,” says Lawrence, a native of Trinidad and Tobago. “My field of technical communication has produced an amazing body of work that helps guide and sets standards for the design of written and visual artifacts, but on the matter of speech/sound, we were oddly quiet. My own experiences of speaking with a non-standard, yet native, accent became a space for me to explore design challenges with speech devices—

personal assistants, talking meters, bank tellers, etc.”

Her interest in inequities within technology fueled her to write “Siri Disciplines,” an essay that will be published in *Your Computer Is on Fire*, a new book forthcoming from MIT Press in 2021. While the book looks broadly at biases, inequity, and marginalization within technological systems, Lawrence says her piece argues that voice technologies and personal assistants such as Siri and Alexa “engage in disciplining speakers whose accents aren’t considered standard accents.” The devices do not recognize her non-North American accent, she says, requiring her to attempt to modify her accent to sound more like someone from the United States, or not use them at all.

“My paper argues that this linguistic accommodation—rooted in biases against certain accents, which are neo-imperial impositions (also called digital imperialism)—is no different from

colonial practices of imposing language on conquered peoples,” Lawrence says.

Lawrence was recently named a 2020–2021 Diversity and Inclusion Faculty Fellow at Towson, an honor that will help fund her latest project documenting the syntactic and lexical adjustments speakers of African American English must make in order to successfully use speech technologies such as Amazon’s Alexa. She says she would also like to find ways to bridge the academic-industry divide through her research.

“So many products are developed without the engagement of user needs, concerns, and impact,” Lawrence says. “The research I do sheds light on the real threat—bias, discrimination, and surveillance—that technology products pose to underrepresented users of technologies. I’d like to work with industry to better understand how and why accent bias exists in the design of speech products, and how this accent bias can be addressed.”

# EXPLORING USERS' RELATIONSHIPS

# TO VIRTUAL ASSISTANTS



Leilasadat "Leila" Mirghaderi



Monika Sziron

## Is this relationship getting too serious?

Researchers at Illinois Institute of Technology's Center for the Study of Ethics in the Professions are taking a closer look at how people relate to the virtual assistants in their lives, including Alexa, Siri, and Google Home/Google Assistant. Professor of Philosophy and CSEP Director **Elisabeth Hildt** and graduate research assistants **Monika Sziron** and **Leilasadat "Leila" Mirghaderi** are now analyzing the findings of an interview study that they completed earlier this year exploring emotional attachments to virtual assistants, with the goal of publishing their research.

"There are always claims as to how big these technologies will be, how emotionally attached we're going to be, and how different humanity is going to be because of technologies like this," says Sziron, who along with Mirghaderi is enrolled in the Ph.D. program in technology and humanities. "We wanted to get to the bottom of whether there is this emotional attachment that people are insinuating is going to happen. We wanted to do some interviews and see what people were actually thinking and doing versus what movies and science fiction are projecting."

Hildt, Mirghaderi, and Sziron began the study in fall 2019, bringing in 26 student participants from Illinois Tech, with most interviews conducted in person, pre-pandemic. Participants were asked what they perceived to be the advantages of using virtual assistants; whether they used virtual assistants more when they

were with people or when they were alone; whether they felt the assistant was aware of and responsive to their intentions, actions, or feelings; and much more. What they revealed, Mirghaderi says, is that at this point the technologies are lacking features that might increase users' emotional attachment to them.

"I think we can see that many people anticipate users will form these attachments, but it's not happening right now," Mirghaderi says. "They will need it to be more human-like and more intelligent, based on our findings. This is what most study participants shared."

Still, other revelations about users' experiences with virtual assistants emerged from the study. In particular, Hildt says, the participants had interesting perspectives when comparing virtual assistants with human beings, and interesting thoughts on the role of the assistant's voice. Some participants expressed concerns about possible surveillance, while others were frustrated with the technologies not recognizing their accents.

"What matters is how we react to the technology, how we integrate the technology into our lives," Hildt says.

The three researchers say they are considering a follow-up study on users' relationships to virtual assistants post-pandemic, given the amount of time people have begun spending at home with technology.

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