Engineering and Education: Making Hardware Labs Accessible and Scalable
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Mary Gates Scholar, NASA Space Grant Scholar
Mentor: Rania Hussein, Electrical and Computer Engineering

The COVID-19 pandemic necessitated a shift to online learning options which brought significant challenges to courses with major hands-on components. The Remote Hub Lab (RHLab) of the University of Washington's Electrical and Computer Engineering department was established in response to the pivot to online instruction. The RHLab provided students with remote access to industry-grade hardware, an initiative that eliminated the need for shipping lab kits during the pandemic as well as the maintenance and purchase of new components after the return to in-person instruction. The lab has been used successfully since Autumn 2020 in delivering the Electrical Engineering (EE) 371 course. A recent study showed that students who use the RHLab for assignments have similar learning outcomes to those in traditional offerings with physical lab kits. This research builds on that study, exploring educational improvements to engineering laboratories and seeking to increase scalability and advance accessibility for wider audiences and underrepresented communities. By discovering how engineering laboratories can be more accessible for learners in a post-pandemic lens, this research identifies an optimal combination of remote methods for engineering laboratories through three data-gathering approaches. First, I conducted a literature review about equitable access in engineering education and remote engineering labs in a post-pandemic context. Then, I conducted a survey among winter 2022 EE 371 students, qualifying and quantifying their definition of equitable and scalable access. Finally, I developed an introductory digital logic lab curriculum which leads to Hardware Description Language (HDL) proficiency. These primer projects which leverage the RHLab allow for self-guided exploration of digital logic, and the curriculum will be used in future RHLab documentation and advancements. Expected findings include the surveyed students’ suggestions for improving the accessibility and scalability of remote labs and engineering education, results which will be implemented in the RHLab’s future work.

Nursing Hagiographies and Erased Black Legacies: How Have the Foundations of Nursing Shaped its Future?
Marlowe Barrington, Junior, Pre-Nursing
Mentor: Maria Elena Garcia, Comparative History of Ideas
Mentor: Adam Warren, History
Mentor: Jos?? Antonio Lucero, International Studies/CHID
Mentor: Lydia Heberling, English, University of Washington, Seattle

This project is an investigation into monuments to colonialism and racism within nursing in the United States. A monument could be a person or their legacy that survives through a medical instrument, policy, or practice. This project will specifically address the centuries of harm inflicted upon Black women by the colonial mothers of nursing and the prevention and erasure of Black nurses in the field. My research question is: How do the hagiographies (idealized biographies) of foundational white female nurses hide the racist and colonial origins of nursing and how does this erasure ultimately shape the profession today? To explore this question, I draw on resources from the UW’s libraries and archives as well as the Mary Mahoney Professional Nurses Organization. More specifically, I explore the work of nurses such as Florence Nightingale and Mary Eliza Mahoney to better understand how the legacies of white women have been strategically crafted. Additionally, I investigate the history of the University of Washington’s School of Nursing to better understand how schools of nursing may have prevented the education of Black women. The UW School of Nursing is a prestigious nursing school and is ranked as No. 1 for public institutions nursing graduate programs. I will also give you a glimpse into how my summer research project has evolved into my CHID senior thesis. This project is significant because these monuments manifest as barriers to access and care for marginalized communities and have created grounds...
for community mistrust. It is crucial to change the system of medicine in the United States so that vulnerable communities can heal rather than experience further harm. I believe that in order to change or disrupt the system, an understanding of its foundations is imperative.

Mapping Child-to-Parent Violence: Reducing the Stigma, Enhancing Perpetrator Functionality and Victim Safety with Effective Interventions
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Mentor: Linda Forst, Shoreline Community College

Child-to-Parent Violence (CPV) is defined as youth’s actions to gain power and control over a parent or caregiver with the deliberate and pervasive use of physical, psychological, and/or financial means. Research shows that 7-22% of the population experiences CPV, also known as APV (Adolescent-to-Parent Abuse). CPV is one of the most rapidly growing, underreported, and under-researched societal problems. This literature review tracks the evolution of CPV in definition and scope. It categorizes abusers and abuses including underlying psychopathology while defining victim and perpetrator indicators and risk factors. It highlights barriers in seeking, obtaining, and completing rehabilitation which include cultural contexts and stigma to familial role reversals and inadequate resources. The complexity of CPV is reflected in the lack of acceptance, array of responses, and inadequate interventions shown to exacerbate the recidivism and drop-out rate of intervention systems that are not robust or adequately designed specifically for CPV. The review shows that without intervention, the cycles of multi-generational family abuse including CPV will continue to rise and gain intensity. I reviewed peer-reviewed scholarly articles and government documents to evaluate multiple aspects of CPV responses and interventions categorized as crisis response, therapeutic interventions, judicial interventions, and hybrid models in their availability and effectiveness. I found that interventions which offer full-family/community, wrap-around, multi-faceted methods are the most effective to reduce stigma, improve overall family well-being, while reducing negative outcomes. Therefore, these systematic CPV intervention methods should be modeled everywhere with encouragement for more robust research in the phenomenon of Child-to-Parent Violence resulting in healthy societies.

Implicit Anti-Fat Attitudes Among Blind Women
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UW Honors Program
Mentor: Noam Weinbach
Mentor: Eric Stice, Psychiatry, Stanford University

Previous studies show that the high prevalence of body image concern and disordered eating among Western women precipitates from the promotion of an unrealistically thin body ideal. Exposure to thin-idealized images on social media has been found to increase body dissatisfaction and perpetuate internalization of anti-fat attitudes. The present research examined whether implicit anti-fat attitudes can be internalized without ever being visually exposed to body shapes. Preliminary results from a sample of blind women (N = 18) in Israel revealed that implicit anti-fat attitudes in blind females are comparable to those of sighted controls. The purpose of this study was to expand on these original findings by administering a novel auditory weight-bias Implicit Association Test (IAT) to larger samples of blind women (N = 30) and sighted controls (N = 30) across the United States. Participants completed an auditory IAT in which they paired words describing thin bodies and words describing overweight bodies with either negative or positive words in congruent and incongruent blocks. Afterwards, they answered self-report questionnaires to evaluate body dissatisfaction, pursuit of the thin ideal, and perceived pressure from family, friends, significant others, and the media to attain a thin body. In our analysis, I helped compare reaction times of blind and sighted female participants. Implicit anti-fat bias was reflected as slower reaction times when words describing overweight bodies were paired with positive words compared to when they were paired with negative words. If results of the present study replicate the preliminary results, we will develop stronger evidence towards the existence of non-visual influences that contribute to thin-ideal internalization. Additionally, these results would demonstrate that internalization of the thin-ideal can occur without any visual exposure to body shapes. These results may shed light on sociocultural factors that should be considered in evaluating disordered eating risk among blind women.

Does Fingernail Length Affect Hand Washing Effectiveness?
Eden Gres, Fifth Year, Postbaccalaureate Study
Mentor: Ann Murkowski, Biology, North Seattle College
Mentor: Heather Price, Chemistry, North Seattle College

Improper hand hygiene can lead to the transmission of various diseases including gastrointestinal infections, such as salmonellosis, and respiratory infections, such as influenza, colds and coronavirus. The area under the fingernails (subungual area) is a source of bacteria accumulation that is often overlooked during hand washing. This research evaluates the effect of fingernail length on the effectiveness of a 20 second hand wash on reducing subungual bacteria counts. We performed a randomized controlled trial to determine total bacteria counts of the subungual area right before and after a 20 second hand wash with antibacterial soap. Bacteria counts were determined on standard media after a 72 hour incubation. Subjects were grouped by fingernail lengths of 0mm, 0-1mm, 1-2mm, >2mm, with a control group of 0mm. The results suggest that regularly trimming fingernails and paying
attention to the subungual area during hand washing may be an important tool in preventing infections and diseases caused by pathogenic bacteria and viruses. This is especially important for people with impaired immune systems or young children who are more susceptible to infections, as well as for people who can transmit diseases to others, like healthcare personnel and childcare providers.

The Relationship Between Self-Compassion and Anxiety/Depression in Children With and Without ASD: The GENDAAR Study

Rachel Kinkley, Senior, Psychology, Informatics
Mentor: Megha Santhosh, Child Health Behavior and Development, Seattle Children’s Research Institute
Mentor: Sara Webb, Psychiatry & Behavioral Sciences, Seattle Children’s Research Institute

Autism Spectrum Disorder (ASD) is a developmental disorder that can impair social and communication skills. Many individuals diagnosed with ASD experience other mental health disorders such as anxiety and depression. Research has estimated that between 63-70% of people with ASD suffer from depression while 50-58% experience anxiety. Anxiety and depression both have been found to have a negative correlation with self-compassion for ASD children and typically developing (TD) children. Self-compassion is the concept of being caring towards oneself and is characterized by three facets: (1) self-kindness (2) common humanity, and (3) mindfulness. The present study seeks to explore the relationship between self-compassion and anxiety/depression and how this may vary for children with ASD compared to TD children. To examine this, 55 children (ASD=21), ages 7-17 years from the longitudinal ACE2 study, a five-site NIH-funded study on gender differences in autism were included in the analysis. ASD diagnosis was confirmed via standardized measures. Self-compassion was measured using the Self-Compassion Inventory for Youth, a self-report tool that generates scores on two scales: self-compassionate coping scale and self-punitive coping scale. Anxiety and depression were measured using the Youth Self Report (YSR), a self-questionnaire assessing symptoms of anxiety and depression. We expect that children with ASD will experience a stronger negative correlation between self-compassion and anxiety/depression than TD children. This relationship is critical to understand as individuals with ASD can experience difficulty practicing self-compassion. Cognizance of the relationship between these two constructs may help inform beneficial interventions and treatments for children with ASD to alleviate symptoms of anxiety and depression.

Integrating Disability Studies at UW Bothell

Nicole La Belle, Senior, Gender, Women, and Sexuality Studies
Mentor: Neil Simpkins, IAS, UW-Bothell

I, along with advisor Dr. Simpkins and student peer Katie Ward conducted research on integrating disability studies in their classrooms, by surveying faculty and students who self-describe as having a disability across an extensive tri-campus state school system. With an emphasis on intersectionality, interdisciplinarity, and interrogating diversity, the team researchers, including myself, will offer tools for bringing disability studies into conversation with existing curricula. In spending the past two quarters on this project, I have extensively read about disability, intersectionality, and interdisciplinarity. I have since utilized these readings to correctly write the surveys the team used for collecting data, being a significant contributor to our paper, and being a significant contributor to the term reference collection and academic resource collection. At the symposium, I will outlay the progress our team has made thus far, including writing the survey, sending them out to all three University of Washington campuses, and receiving the data back to analyze it and make conclusive understandings. I will also present the disability term book and resource collection that we compiled for faculty, staff, and students to access utilizing disability curriculum content. The rest of the team and I will then address our future hopes for implementing a disability curriculum and the concerns of both groups with integrating disability studies in classrooms across the curriculum. I will also describe their use of Pressbooks to publish an open-source resource that collects their findings; this resource offers suggested materials, teaching strategies, and research guides to support instructors who are less familiar with disability culture and disability studies to bring disability-related content into their teaching.

Developing a Framework for Designing Interactive Spatial Experiences

Annie Liu, Senior, Human Centered Design & Engineering
Mary Gates Scholar
Mentor: Brock Craft, Human Centered Design and Engineering

The Internet of Things, also known as IoT, refers to the network of physical devices that can send and receive data through the Internet. These devices are often embedded with sensors and process data which is then communicated to humans, giving us greater control over the spaces that we inhabit and introduces ways to interact with technology that goes beyond screen interfaces and into the physical world. Internet of Light (IoL) is a Human Centered Design & Engineering (HCDE) research group where we leverage IoT technologies for creative expression, data visualization, and human con-
nection. Students in the group design and develop an interactive lighting installation located in Sieg Hall on the University of Washington campus, utilizing the canvas of Philips Hue Smart Lighting. However, students, both new and returning, are tasked to learn how to program the lights, design an installation idea, and build it all within 10 weeks. Too much time is spent on learning the technicalities of programming the installation, leaving little time for students to dive deeper into the creative process, experiment with different possible interactive modes, and execute their ideas. This project is developing a framework for designing interactive spatial experiences that aims to address recurring issues and maximize learning efficiency, which would allow future runs of the research group to be more successful. I’ve designed and created a set of learning materials including slide decks, video tutorials, and organizational tools aimed at cutting down learning time from a previous average of 3-5 weeks to 1-2 weeks. Establishing this framework gives future students the necessary tools and additional time to experiment, design, build, and evaluate their installations. I anticipate that future iterations of the IoL research group will offer students a more complete installation designing experience and produce higher quality installation experiences as a result.

An Assessment of How the COVID-19 Pandemic Worsened Social Determinants of Health Factors for the African Community in King County Washington

Jackie Madhava, Senior, Healthcare Leadership (Tacoma Campus)

UW Honors Program
Mentor: Sharon Laing, School of Nursing and Healthcare Leadership, University of Washington Tacoma

The COVID-19 pandemic exacerbated the impact of social determinants of health factors which consequently led to a disproportionate effect of the virus on the health of immigrant communities. This study focuses on African communities in King County, WA and explores how socio-economic factors such as lack of adequate healthcare, low-income status, and lack of social safety nets were made worsened by the COVID-19 pandemic. The research team recruited African immigrants from a local community health center, Health Point Community Health Center in Kent, Washington. The respondents (n=8) were interviewed via zoom or in-person and were asked 10 open-ended questions which addressed the experience of social, economic, and psychological challenges during the global pandemic. Thematic analyses were conducted of transcribed responses. Several themes emerged: (1) Stress and distress attributed to the inability to provide for respondents’ basic familial needs; (2) Experience of anxiety attributed to housing insecurity; (3) Emotional trauma associated with inadequate access to healthcare resources. These findings demonstrate that African communities experienced substantial social and economic disadvantages, however, these factors were substantially worsened by the global pandemic and placed this community at heightened risk. It is recommended that members of racial and ethnic minoritized groups, such as the African community, must be supported with resources enabling access to basic social, psychological, and healthcare needs. Future public health strategies should focus on empowering the community by engaging its members in policy-making processes that can help assure that their needs can be met.

An Investigative Study on Communication About Disability Accommodation in Higher Education
Natasha Ann Sidik, Senior, Psychology
Mentor: Jennifer Mankoff, Allen School of Computer Science & Engineering
Mentor: Kelly Mack, Paul G Allen School of Computer Science and Engineering, Computer Science

Disability Services (DS) are the most common strategy for ensuring that students with disabilities have access to higher education. These offices provide accommodations for students that can apply to both physical (e.g., building) and digital (e.g., course content) accessibility. Prior work has shown that the access needs of disabled students are not always successfully provided, and if they are, they are not always accomplished in a timely manner. Consequently, there may be dissonance between when professors believe an accommodation has been fulfilled (e.g., when a PDF they posted has been made accessible by DS) and when it is actually completed. While prior work has documented the accessibility challenges faced on university campuses and with disability services, work has not yet focused on how to better support DS, student, and faculty interactions and communication. This study aims to do so by investigating how communication currently flows, the issues that arise within interactions and implementations, and whether technical solutions can better support interaction for the accommodation fulfillment process.

Use of Mental State Terms in Mandarin-English Immersion Student Narratives
Yana Ulitsky, Fifth Year, Speech & Hearing Sciences
Anna Nolan, Fifth Year, Speech & Hearing Sciences
Mentor: Amy Pace, Speech and Hearing Science
Mentor: Alexander Tang, Asian Languages and Literature

Mental state terms refer to the narrator’s interpretation of a character’s cognitive state such as what the character says, wants, intends, or thinks (Altman et al., 2015). However, previous research on mental state terms has documented conflicting results regarding the frequency of mental state terms used across languages (Altman et al., 2015; Fichman et al., 2021). The current research examines children’s use of mental state terms by elementary school students (1st, 3rd, 5th, and 6th grade) enrolled in a Mandarin-English Dual Language Immersion (DLI) program in California. Children completed
a story-telling task, and their narratives were based on the wordless picture book “Frog where are you?” in English, and “Frog goes to dinner” in Mandarin. Speech samples were collected and recorded over Zoom and then transcribed on Computerized Language Analysis (CLAN) software. Transcripts were coded for instances in which individuals of each grade level used mental state terms. Data collection is complete and analysis is in progress. In this study we will answer: (1) How often are children using mental state terms during a narrative production task in Mandarin and English? (2) What kind of emotional language use differences are seen across Mandarin-English and grade levels? We hypothesize that the frequency of mental state terms will be higher in English because English-speaking cultures place greater emphasis on conveying motivations or feelings involved (Sah & Torng, 2016). Across grade levels, we expect older children to use mental state terms at a higher frequency than their younger peers. Investigating how children make use of these devices in narrative production as they acquire two languages can provide insight into cultural priorities around storytelling.

**Measuring the Impact of City of Seattle on Clearing Homeless Communities: 2008-2021**

Wei Yang, Senior, Informatics, Sociology

Mary Gates Scholar, UW Honors Program

Mentor: Zack Almquist, Sociology

Tent encampments are an increasingly common form of dwelling for the homeless population in the West Coast. Recently, the Ninth US Circuit Court of Appeals has stated “[a]s long as there is no option of sleeping indoors, the government cannot criminalize indigent, homeless people for sleeping outdoors, on public property, on the false premise they had a choice in the matter.” However, many city residents worry about issues such as local impact on the environment and criminal activity. Oftentimes city officials are pressured into action by homeowners for encampments not sanctioned by the local government. Removing (or sweeping) encampments not sanctioned by the city eliminates their impact on the surrounding community, but also disrupts the lives of the already-vulnerable people living in them. Debates among the public, activists, and the government on how to address encampments in public spaces are salient, polarized, and evolving. However, knowledge of the number and locations of encampments is still limited. Using data from Google Street View, combined with reports from The Seattle Times and the City of Seattle reports on removals, my study will chart the spatial growth of tent encampments and measure changes in responses to the City of Seattle’s interventions from 2008 to 2021. By linking the dataset of tent encampments removals with neighborhood level US Census American Community Survey data, I will use event history analysis and spatial statistics to measure the impact of encampment removal activities on local neighborhood demographic change, gentrification, and crime rate. This study expands the scope of homelessness encampment displacement research over the last decade in Seattle. Understanding encampment sweeps in Seattle is important for policy researchers and social scientists studying West Coast urban environments.