

Disability Studies at Lafayette College

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Introduction

“Furniture and tools, kitchen and campuses and city streets - nearly everything human beings make and use is assistive technology, meant to bridge the gap between body and world. Yet unless, or until, a misfit between our own body and the world is acute enough to be deemed disability, we may never stop to consider - or reconsider - the hidden assumption on which our everyday environment is built.”

Sara Hendren (2020, p. 2)

According to the CDC, approximately one in four adults in the United States live with a disability at some point in their lives that affects major life activities (CDC, 2018). This jarring statistic is measured by six types of disabilities - mobility, cognition, hearing, vision, independent living, and self-care - and represents the commonality of disabilities. Engineers traditionally design and manufacture products with the intent of making the world more functional and more available. However, this often has adverse effects, not only for the general population, but especially for people with disabilities. Engineering students have historically not been trained to put disabilities at the center of their design processes, and rather view accessibility as an afterthought. Throughout the creative process, designs are intended for able-bodied people, leading to further exclusion of those who are disabled. People with disabilities have always had to be the ones to change the world to work better for them, but the responsibility should not be fully theirs. In order to create a society that is better suited for people with disabilities, engineering education curriculum must be changed to raise awareness about disabilities and leave room for the “human factor” in design. Lafayette College currently offers

only a few educational opportunities - courses or research - about disability studies; this project is intended to offer options to address this within the engineering department, as well as in general academia at Lafayette.

Changing the engineering education curriculum has many challenges. As of now, Lafayette, along with many other engineering colleges and universities, have minimal to no course offerings regarding disability, whether these courses are technical or social. There are four professors among Lafayette's eight engineering disciplines (encompassing six majors) that study/teach disabilities. Without professors that are knowledgeable about disabilities, engineering students cannot be properly educated about how to alter their design processes. Integrating disability studies into engineering will also require financial commitments - aside from hiring additional professors, the department may need to purchase equipment and technologies that are specific to disability design. Overcoming these challenges requires the college to prioritize disability studies in the curriculum.

First, our college communities must have an overall increase in awareness of disabilities. While we are putting our focus on engineers, this awareness needs to be widespread among all college disciplines rather than only in engineering. This could present opportunities for engineers to work together with fellow academic divisions such as psychology and sociology in order to create the best designs possible for people with disabilities. Logistically, there can be specific shifts in the curriculum and offerings to provide a just learning experience for students with disabilities. In terms of the curriculum perspective, providing the needed accommodations for disabled students is the main step into making sure that disabled students can access all course offerings. Stepping beyond providing an equal learning space, the curriculum can be more specific in providing courses and co-curriculars to teach future engineers *about* disabilities. The

goal of such a curriculum is to teach all engineers to be receptive to the needs of the disabilities, as well as the rest of the society.

The topic of disability studies aligns with human centered design/humanitarian engineering. It may seem unclear what disability studies has to do with Engineering Studies as a major, since this reform seems so “design-focused.” Design for disability is not as technical as we think - it is not about a group of design engineers coming together to create a specific product that will make life easier for a specific disabled individual (Hendren, p.10, 2020). Rather, this is about engineers - and society in general - learning to view design from a different perspective: to understand and empathize with the disabled community, and recognize that there is no “quick-fix” technology, especially since no two disabilities are exactly the same.

As Engineering Studies students, our focus of this project is to put humans at the center of design, rather than putting technology at the center. In order to accomplish this, we spoke with faculty members from several academic divisions - psychology, neuroscience, and mathematics - rather than just engineering. This reflects the interdisciplinary aspect of Engineering Studies, as well as the notion that engineering is not always technical. Engineers should learn about people with disabilities and their daily struggles that may seem minor to people without disabilities - they should not be skipping straight to the technical portion. Initially, we will provide a framework to showcase the struggles that the disabled community faces in our built environment and how design often neglects their needs. We will then analyze two exemplary programs from other institutions and analyze the social and technical context by which they practice design for disability. We will then explore the social and political context of disability studies as a part of an audit of what disability studies programs/research Lafayette has already offered. Finally, we

will recommend integrating the practices of our model institutions with the curriculum at Lafayette and specify how we plan for this to be implemented.

Framework – How Disability has been Excluded from Engineering

In a society where disabilities are often viewed as medical “problems” that need to be fixed, disabled people are widely misunderstood and overlooked as a community (Hendren, 2020, p. 14). The biological aspects of disabilities are seen as medical issues that can be ‘healed’ eventually through technology. This idea that people with lack of limbs can be enhanced by a prosthetic, better glasses can help the blind, and advanced hearing devices can guide the deaf, is harmful to the disabled community - rather than seeing disabilities as both personal and medical problems, disabled people should be accepted as a part of society that has different needs and accommodations (Hendren, 2020, p. 23). Disability studies has the potential to show people that the world has been designed to exclude many people with a wide range of disabilities and disability studies can lead to a more accepting and accessible world. Disability studies signifies how we as individuals can bring about the necessary changes in our society, to avoid discrimination (whether intentional or not) toward people with disabilities.

For as long as engineers have existed, the built world has been created for nondisabled people . People with disabilities, whether physical or mental, have often had to bring their bodies to meet the built world, rather than the built world meeting their bodies. As much as technology may help make disabled people’s lives easier, they are left out from the remainder of the design for society. It is important for engineers, and society in general, to understand that each disability is very unique – rather than beginning our design processes with having the mindset that we can create something to help thousands of people, we have to focus on the social aspect. By

collaborating with/learning more about the disabled community, we can begin to understand their experience, leading to better design and connectedness.

While the initial purpose of technology is innovation and improvement of society, these technological advancements have the possibility of putting the disabled community at a disadvantage. A prominent example of a counterproductive technology is plastic straw reform. As we have seen in recent years, movements have begun globally to ban plastic straw use in an effort to reduce plastic waste in our waterways, specifically the ocean. Large campaigns have gained momentum such as the Save the Turtles organizations whose mission is to reduce plastic waste, beginning with plastic straws. These organizations use catchphrases such as “skip the straw - save a turtle” to discourage people from using straws in their drinks, both in public settings and at home (Albritton, 2020). While the environmental benefits behind these efforts are understandable, banning plastic straws puts many members of the disabled community at risk because these people rely on straws to be able to eat and drink - “for many people with disabilities, going without plastic straws isn’t a question of how much they care about dolphins or sea turtles; it can be a matter of life or death” (Danovich & Godoy, 2018).

An article featured on the website of the National Public Radio, a public nonprofit organization, shows the perspective of a father, Jordan Carlson, whose a child has motor-planning delays and requires a straw to drink. He sheds light on the struggles disabled people face when they are not given the option to use a plastic straw at a public restaurant. In an effort to phase out plastic straws and still provide options to drink from straws, engineers have created alternatives such as paper, silicon and metal straws. However, these alternatives all pose risks to the disabled community and are not as effective as plastic straws are (Danovich & Godoy, 2018). Carlson discusses these alternatives and their negative attributes - “There are

many alternatives to plastic straws — paper, biodegradable plastics and even reusable straws made from metal or silicone. But paper straws and similar biodegradable options often fall apart too quickly or are easy for people with limited jaw control to bite through. Silicone straws are often not flexible — one of the most important features for people with mobility challenges. Reusable straws need to be washed, which not all people with disabilities can do easily. And metal straws, which conduct heat and cold in addition to being hard and inflexible, can pose a safety risk” (Danovich & Godoy, 2018). These “failed alternatives” are representative of the fact that engineers did not have these issues in mind when designing straw alternatives. If the perspective and struggles of the disabled community had been taught in engineering academia, engineers would not only have been creating a straw alternative, but would have also considered how effective it would be for people with disabilities who rely on straws.

While the accommodation process can do a lot of good for disabled communities, it can also do a lot of harm. In the process of creating accommodations while working with the disabled community, engineers should not fully rely on these people in the design process. The disabled community can begin to feel like a burden for needing to contribute to such a long “process” of design, just so that the built world accommodates them better. In addition to this, a disabled person being surrounded by/interacting with groups of designers with “abled-savior” complex can lead to increased risk of depression and anxiety in disabled persons. Thus, any nondisabled person who is designing for disabled people needs to find a balanced way to incorporate the input of disabled people without overwhelming them. Although society cannot leave it up to disabled people to fix the world for themselves, it also cannot leave them out of the process completely. Often, engineers approach these problems thinking that they know what is best, simply because they know how to properly fulfill the technological aspect of design – this

leads to poor accessibility and voices of disabled persons not being heard. Instead of this, there needs to be a good balance of collaboration between engineers and disabled people. They should listen to their viewpoints, draw from them, ensure that their goals are aligned, and go from there – they should not be putting the pressure on disabled people to revise accessibility and disability awareness. Essentially, abled people should constantly be looking to disabled perspectives.

Many people may easily assume that society is already designed for people with disabilities – seeing handicapped parking spaces, ramps going into buildings, and the occasional wheelchair-accessible public restroom; however, this can lead to naïve understandings. Truthfully, our society is doing the bare minimum – and this is reflected even more heavily in lower-income communities. For example, some cities have been doing a better job of incorporating curb cuts into sidewalks to allow for wheelchairs to easily enter and exit a sidewalk. However, this is not really included in lower income communities that do not have the funding to maintain their roads and sidewalks. Though not a lower income community, many of the sidewalks on College Hill are a perfect example of this. Not only are they often quite rugged and cracked, but curb cuts are few and far between, leading to difficulties in wheelchair access. Another accessibility issue in towns, especially at the height of the COVID-19 pandemic, is outdoor dining. As it can be seen in downtown Easton, as well as many other cities (large and small), sidewalks are being blocked off to allow for outdoor dining spaces. This is dangerous for anyone, but especially for physically disabled people who may walk slowly or use wheelchairs, as their only option is to walk into a busy street around blocked-off portions of sidewalks. In an already inaccessible city, this creates an environment impossible for disabled people to navigate. Examples such as these represent the lack of understanding from the perspective of engineers and other designers. If disability awareness can begin at the academic level, engineers will

“design for disability” by default and have a holistic understanding of the common struggles faced by the disabled community.

An editorial by the Civil Rights Education and Enforcement Center from 2015 references the inaccessible curbs throughout Seattle, 25 years after the Americans with Disabilities Act was passed. At the time this had been written, a class action lawsuit had just been filed against the City of Seattle for failure to comply with the Americans with Disabilities Act, the Rehabilitation Act, and state law. Disabled citizens of the city were not provided with full and equal access to Seattle’s pedestrian right of way system due to missing, broken, and poorly maintained curb ramps, leaving crosswalks and sidewalks inaccessible to wheelchair users (CREEC, 2015). Though many states’ laws required installation of curb ramps at intersections and crosswalks as early as 1973, Seattle had failed to properly implement this (CREEC, 2015).

Persons with mobility disabilities had felt that every effort was being made to make Seattle a walkable city, but no efforts were being made for it to be “rollable.” These are not matters of aesthetic or convenience, but rather a necessity for these citizens to be able to safely and equally access their own communities. Lack of a curb ramp (or curb cut) at a crosswalk or intersection causes a person in a wheelchair to have to swing into lanes of oncoming traffic - in a city flooded with busses and cars, this is a death sentence. This issue in Seattle gained such strong momentum that a social media campaign was created by Disability Rights Washington - in order to raise awareness of the systemic problem of accessible curbs, members of the disabled community were encouraged to share their experiences on social media using the hashtag #CrappyCurb (CREEC 2015). Campaigns such as these reflect how the disabled community is affected by poor aspects of the built environment which inhibit them from carrying out necessary daily activities.

Shifting to Lafayette, we are about thirty years behind when it comes to accessibility standards. President George H. W. Bush passed ADA in 1990, and Lafayette has made minimal efforts since then to align with the standards. In Lafayette's Office of Admissions, student tour guides have been taught a confusing alternate route that they are to use when giving tours to persons with physical disabilities. This route is very different from our typical tour route, and it is a perfect representation of how many hoops a person with a disability must jump through in order to tour some buildings on campus. They are limited to seeing less buildings than the typical prospective student or family member, because not all of our buildings are easily accessible. While it may seem that it would be too expensive and involved to make such drastic changes to these buildings, it would not have been difficult had they begun thirty years ago. Since ADA was enacted, we have constructed at least five new buildings on campus, not to mention the many buildings that have undergone renovations since then, as well – never with disability at the forefront of planning. Lafayette is inaccessible to other disabilities, as well. We do not currently offer an American Sign Language (ASL) tour for those who are deaf/hard of hearing, nor do we use microphones to be able to project our voices further. Zoom currently offers a package where there is an option of using Closed Captioning, which would be very beneficial to those with hearing disabilities. Unfortunately, this package has an additional cost and the College does not seem to currently operate using this version of Zoom.

The aforementioned examples are representative of the fact that disabilities are often overlooked in our everyday lives and settings. To people without disabilities, the goal of designing the built world is proper aesthetic and ease of access. However, the disabled community relies on aspects of the built environment to be functional for them so that they have equal rights to school, work, and recreational activities. In order for the mindset of nondisabled

people to shift - and for the built environment to be designed for disability - academia must be structured so that the perspective of the disabled community is consistently viewed. More specifically and for our purposes, engineering students should be trained to design for disability and incorporate accessibility into the engineering design process.

Phase 1: Model Institutions

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As part of our analysis of disability studies, it is important to view various examples of what disability studies *could* look like on college campuses. This helps the reader as well as our team to better understand what disability studies entails and ponder on what can be done at Lafayette College. The following examples are two educational institutions that are very different by nature and do extraordinary work on leading the disability studies academia. They were selected as an overlap between engineering education and disability studies and they set a high bar for the future of disability studies at Lafayette.

Case Study #1 : University of Washington

University of Washington (UW) is a public research university in Seattle, Washington. As a public research university, UW is in a position where research is common courtesy and with more than 2,500 faculty members and over 46,000 students, there is a tremendous amount of human power to dive into diverse academic inquiries. A long-lasting collaboration between engineering and disability studies is one.

UW's engineering college is a well-known institution with the mission of "*develop[ing] outstanding engineers and ideas that change the world*" (University of Washington, 2020). Under this ambitious mission, the college houses nine different departments varying from aeronautics to human centered design & engineering, which will be the main focus of this section. The exemplary part of UW in terms of disability studies is how they have embraced a human centered design approach for their engineers. The establishment of a human centered design department showcases academic possibilities of a socio-technical understanding of engineering.

Human Centered Design & Engineering (HCDE) Department

Human centered design (HCD) is a problem-solving approach that utilizes a series of iterative, often nonlinear steps to tailor-make solutions for complex problems (Leung et al., 2020). It focuses on the user need and iterative design process to find solutions for problems. It focuses on the ‘human’ of the problem and tries to understand the human’s experience as well as needs to the engineering design process.

The relationship between design and engineer is more of a linear one where engineers use design techniques to solve problems that they believe need to be solved. The education that engineers are exposed to is traditionally focused on improving the engineer’s technical design skillset to find solutions for real problems. Engineering education, by majority, focuses on ensuring the technical proficiency of the engineer. Given the demanding nature of building a technical skill set, most of an engineering education curriculum is built upon teaching students about how to design, not so much about who to design for. Engineers learn to interact with the machinery to get them to do certain tasks, not so much to interact with people who will later become the users of their design.

HCD methodology and practices brings up a new perspective to engineering education by training the engineers to put the user’s experience and needs into the center of the design process. To do so, HCD draws various concepts and practices from Design Thinking, which is a process of creative problem solving. These combined tools complement “*the more technical engineering requirement artifacts with a human-centered perspective*” (Hehn et al., 2019).

UW's department of Human Centered Design & Engineering (HCDE) combines HCD and engineering under one roof. By fostering a greater understanding for the needs of users, the department focuses on creating learning environments and opportunities for their engineers to

design for all parts of the society. Under a perspective of better understanding what disability studies could look like in different institutions, HCDE showcases how engineering education can build more inclusive practices from within.

UW aims to foster engineers that can build projects to serve all parts of the society, a striving goal that requires great collaboration between the department and the community partners. The HCDE department showcases an interdisciplinary engineering education where constant readjustment to the ever changing needs of the society is possible. They describe their vision of their program as *“a just future is possible. We will be the leading academic program integrating empathy and collaboration to design and engineer equitable practices, tools, and technologies across the globe”* (University of Washington, 2009).

In terms of better understanding different communities that coexist within our society, HCD is a key practice to understand the needs of the disabled community. For engineers to step out of their own understanding of ‘ability’ and try to understand the needs of someone who has had a completely different life experience, more training is required rather than only building technical skills. The interdepartmental connections, design thinking practices, and communicating with the community partners that are offered through HCDE are examples of different types of interventions to engineering education to foster engineers who are better suited to work with the disabled community.

HCD by default requires great collaboration of different departments to build a bridge between technical and non-technical skills. For example, design thinking exercises utilize an iterative process where the engineers communicate with their users continuously. They build their prototype around continuous feedback that they receive from communicating with the user. Being able to receive feedback and turn it into actionable design items are more about engineers’

listening skills more than their technical skills. To learn about the social contracts that are built into different communities, engineers need to be aware of social, cultural and gender dynamics which are built into sociology and anthropology curriculums. UW does a great job of forming these interdisciplinary bridges around the campus in a long lasting manner.

The curriculum offering varies from a bachelor and master of science degrees to “The Doctor of Philosophy” program. Very appropriate to its name, the center also offers an “User-Centered Design” certificate for their graduates. With their faculty of 17 tenure and tenure-track faculty and 17 joint or adjunct faculty, HCDE’s interdisciplinary approach does not only seem to be very diverse in terms of interdepartmental connections but also a well established commitment to maintain this diversity of departments in collaboration.

On top of creating open and sustainable communication channels between departments, HCDE also prioritizes communicating with the greater community outside of academia. Human centered design process involves engineers working with ‘humans’ who are not engineers. HCDE utilizes an annual printing, *Designing Up*, to share their yearly accomplishments of faculty, staff and students in the form of a magazine. This is a great practice, not to only expand their communication with the outside world but also to keep a record of the work that different agents accomplish on the campus.

For the greater engineering education framework, human centered design plays a key role in fostering engineers that are capable of working with different communities, one of which is the disabled community. The HCDE program is aiming to pave the path for inclusive design across the nation, and to be internationally recognized. Their strategic vigor in becoming globally recognized showcases an institutional priority on offering ‘human centered design’ not only as a possibility for *some* engineers, but as an integral part of greater engineering education.

That's why the department is an important case study for any college that is aiming to expand their engineering education offering to be more inclusive and collaborative.

History of HCDE

Bringing human centered design and engineering together is an initiative that requires various efforts in a college. It is about working with the other engineering departments to establish credibility, it is about working with other departments on the campus to build the bridges between perspectives. All that work that needs to be done shows itself in the history of how HCDE became a stand alone department in a big public institution. HCDE's history is important to understand how initiatives that aim to improve engineering education are not accomplished within a short period of time. HCDE's case showcases that in higher education, initial igniter(s) of an idea is needed at first. Then, supportive forces carry this undertaking forward. Thus, it requires a lot of forces to be pointing towards the same direction and the whole process is vulnerable to external shocks of the greater university's strategic plans.

Establishment of HCDE can be traced back till 1974. The department, with its full offering and bold vision, was kicked off by Professors James Souther and Myron White from Engineering and from Humanistic-Social Studies (HCDE, 2009). These two professors from different areas started by extending their Technical Communication course to an interdisciplinary minor offering (HCDE, 2009). As this minor offering grew with increasing numbers of faculty, it first evolved into the *Interdisciplinary Program in Scientific and Technical Communication*. This first version of the HCDE highlights the important aspects of it: interdisciplinary, scientific and technical, focused on communication.

By 1986, almost 10 years after the minor's kick-off, the program extended to both master and bachelor degrees. Fast forwarding to 2003, the Graduate Certificate in User-Centered Design was first offered under the minor. This rapid extension of the program both in terms of offerings and size could not be possible if the importance of an interdisciplinary major that focused on communication between the scientific and the non-scientific was not established institution-wide. By 2009, the department officially changed its name to Human Centered Design & Engineering (HCDE) to better reflect their work. In recent years, the department announced a new five-year strategic plan and celebrated their 10th year (HCDE, 2009).

This overall growth of HCDE showcases how change in education policy and offerings start with only a couple of agents on the college campuses. The agents' mission and vision plays an important role to expand the school to an improved version and move towards becoming internationally recognized.

Long Lasting Research: Laboratories and Research Areas

A department on human design engineering does not only offer courses for engineers but also has the space to establish a longer lasting effect on the academia and the communities they are working with. Establishing a department with secured funding creates a platform of an academic community to take up research on their areas of interest. Thus, the diverse research areas play an important role to further the connection between engineering and human centered design, which aligns with UW's goal. Thus, UW's HCDE is a rooftop for bringing together research and laboratories for the interdisciplinary faculty. Therefore, these areas showcase how established research and laboratories can create a long lasting commitment for interdisciplinary research around socio-technical issues and engineering.

HCDE research projects focus on taking an interdisciplinary and sociotechnical approach to “*the interaction of people's practices and meanings with technology*” (University of Washington, 2013). HCDE’s research areas create a platform for students and faculty to engage with these different topics in a sustainable manner. These six interrelated areas of study include (University of Washington, 2013):

- Influencing Behavior, Thinking, and Awareness
- Design for Emergent Collaborations and Organizations
- Low Resource and Underserved Populations
- Material and Embodied Technologies
- Data Science and Data Visualization
- Learning in Professional and Technical Environments

Laboratories play an important role to establish a continuous research agenda that will not fluctuate based on faculty. HCDE offers 15 labs and two sub-centers to establish continuous research platforms for students and faculty. These 15 labs include topics from social computational systems to computer supported collaboration, which are eventually the pillars of the department. Among all of 15 offerings, the most relevant to disability studies are the Human-Centered Data Science Laboratory, Inclusive Design Laboratory, Laboratory for Human-Centered Engineering Education, and the Laboratory for Influence in SocioTechnical Systems (University of Washington, 2013).

Case Study #2 : Olin College of Engineering

Olin College takes a different approach to disability studies, one where inclusive design is not a separate offering or a department, but is built into the core of the understanding of what engineering is. Olin College of Engineering is putting ‘understanding needs’ of their users to the core of a new engineering education method that they are building. Even though their initial starting point is not to further disability studies, their intervention to overall engineering education frameworks creates platforms for the faculty and students to dive into projects that serve the disabled community.

Olin College of Engineering is a private engineering college focused on undergraduate education in Massachusetts. A lot about Olin from its curriculum to culture is an intervention to higher education, as a ‘remaking’ of what college education *should* be like. The college was kicked off in 1997 by the Olin Foundation and by 2002 it accepted its first class of 75 students (Olin College, 2019). As a new undergraduate engineering program within the United States, the college started off with an endowment of \$460 million from the Olin Foundation. With its short history in the education industry, the college succeeded to be ranked the 3rd Best Engineering School in U.S News college rankings (Olin College, 2019).

Among other colleges and institutions that focus on engineering education, Olin College comes into the disability studies and engineering intersection from a different perspective compared to the traditional engineering education. They focus on the mission of “*prepar[ing] students to become exemplary engineering innovators who recognize needs, design solutions and engage in creative enterprises for the good of the world*” (University of Washington, 2020). The mission itself lays out their tri-fold focus area to rebuild the engineering education: raising their engineers to recognize needs, design solutions, and create enterprises for the good of the world. The tri-fold

focus shows how Olin prioritizes their engineers to recognize needs as well as other skills which creates a natural connection with disability studies. For Olin, disability studies is not an outside concept to learn more, but rather the core of engineering, *for the good of the world*.

The ‘Olin’ Experiment

As a new school with a big endowment, the Olin College is also referred to as ‘the Olin Experiment’ of creating an engineering curriculum from scratch and without the boundaries of traditional education. Thus, Olin is trying to intervene in the existing engineering education and this intervention shows a new approach to disability studies as well. The college refers to this by stating that Olin was founded because “*there is a problem with undergraduate engineering education. The traditional curriculum is too narrow; it teaches students how to solve problems, but not how to find the right problems to solve, or how to get their solutions out of the lab and into the world*” (Olin College, 2020a). The college aims to solve this problem by creating a new curriculum and continuously working on improving this curriculum as it progresses.

As the ‘*most ambitious experiment in engineering education in the past several decades*’ Olin aims to embrace an innovative approach to engineering education to provide more hands-on opportunities for students from day one (Guizzo, 2006). This includes not having academic departments within the school, adopting a tuition free program, and not offering tenure positions to professors (Guizzo, 2006). As doing so, it aims to provide students with interdisciplinary opportunities ‘*to go first and then learn*’ (Olin College, 2020a). The school uses project-based, experiential learning opportunities for students as the backbone of their education to provide the true essence of engineering.

The Olin Experiment also provides an experimental approach to embracing disability studies. Their experimental approach includes not having faculty departments to provide an interdisciplinary environment for students and having experiential learning as the focus of the curriculum to increase the communication between the community partners and the college. The ‘success’ of the start-up educational organization model will be unfolding as time goes on with their graduates’ employment and grad-school acceptance rates.

Olin’s Holistic Disability Services Approach

Olin College’s disability services also showcases a different approach to colleges’ traditional disability services. This broad mission sets up the stage for Olin’s engineers to be informed on disability and access rights. A college disability service usually focuses on providing accessibility services for those who need it and works on a case by case basis - as it’s the case for Lafayette College. Olin’s disability services work with the students’ unique need to come up with an accommodation for their academic needs. Olin College’s disability services’ mission steps out from only working with students with disabilities and providing them accommodation, to educating the rest of the college community to be aware of the matter.

The colleges’ disability services embrace a mission of *“educat[ing] all members of the Olin community around access and disability rights”* (Olin College, 2020b). This mission sets out the disability services to a service that works with the whole community to raise awareness. As an engineering-only school, this mission aims to teach about disabilities to all of the community including students, faculty and the staff. This raising awareness goal does not only focus on what disabilities are but also focuses on the rights of people with disabilities. Such a holistic approach creates a basis of having a common language around disabilities established

college-wide, for all members of the community. Educating the community is the first step to establish an inclusive environment for both disabled students as well as disabled community partners.

Olin's disability services also "*ascribe to use a social model of disability and we aim to reduce barriers to access*" (Olin College, 2020b). This approach to disabilities establishes disability awareness as a key part of diversity on campus, and encourages working *with* people with disabilities to find solutions for their living standards for both faculty and non-faculty. Thus, the service does not only work for raising awareness, but also works to take action to increase accessibility around the campus, working with community members who are disabled.

Olin's unique approach to Disability Services creates an outside center working towards increasing awareness about disabilities for their upcoming engineers. Thus, it's an approach that's not only for those students who self selected to learn more about disabilities. Olin's goal is more holistic, in terms of raising awareness for all of their engineers even if this was not an earlier interest of theirs. This is why Olin is also exemplary to showcase results of working with the whole community on raising awareness on disabilities.

Olin's Disability Projects

Olin's holistic approach to disability services provides space for the faculty to run different experimental research projects with community partners. The following examples showcase two different projects with the goal of supporting the disabled community. They showcase works of Dr. Ruvolo and Dr. Hendren in Olin College of Engineering.

1) **Creation of Assistive Technology for the Blind Through Large Scale Co-Design**

In September 2020, Dr. Paul Ruvolo from Olin College of Engineering was awarded a three year grant of \$343K to develop an orientation and mobility app to provide indoor navigation and exploration technology for blind and visually impaired users (Olin College, 2020d).

Prof. Ruvolo is an Associate Professor of Computer Science at Olin. Prof. Ruvolo and his students work “closely with people who are blind to design technologies that are responsive to them as people” (Olin College, 2020e). Their project is building an assistive indoor navigation system as an app for better navigation for the blind community.

As a part of this work, the team works with blind people to identify their needs as they go about their day and interact with various artifacts that are created for able people. The team highlights that the challenges that visually impaired face “*are not intrinsically linked to visual impairment, but rather are the result of environments that are not built with people who are blind or visually impaired in mind and prejudices that exist towards these groups*”(Olin College, 2020e). Thus, as they work to build for blind people, the team also focuses on understanding the existing design constraints as well as the biases that the blind community faces.

Through the grant Prof. Ruvolo received, he will also have the opportunity to teach a course centered on assistive technology and user-centered design where students will be working directly with the community members (Olin College, 2020e). Meanwhile, it will also expand to creating faculty development workshops for building learning experiences that integrate engineering, design, and accessibility content. Besides building a project that can be implemented in real life, the grant will also enable academic inquiries to teach the community about disabilities and build an assistive community (Olin College, 2020e).

2) **Adaptation+Ability Group Lab**

The adaptation+ability group is “a technical and social laboratory for creative research on technology + the body at Olin College” (Olin College, 2020c). The lab runs research on the encounters between humans and the built environment that are designed with ‘the normal body’ in mind. Thus, the laboratory creates space for students and faculty to engage with the history of disabled bodies interacting with technologies that are built for abled bodies, as well as diving into better understanding how to design for disabled bodies.

The Lab is directed by Sara Hendren, who is the author of *What Can a Body Do? How we Meet the Built World*. She teaches human centered design at Olin College. She’s a leading academic in disability studies. Her leadership in the Lab creates a platform for her students to explore the connections between technology and bodies. She uses the following guidelines as the “manifesto” of the lab (Olin College, 2020c):

- We use the terms “adaptive” and “assistive” technologies interchangeably when speaking casually or with newcomers to this field, but we use the terms of adaptation as often as possible.
- We presume competence. This exhortation is a central one in disability rights circles, and we proceed with it in mind as we work with our design partners.
- We work in public. Doing open and public research—including in the early stages—is central to our conviction that design for disability carries with it enormous political and cultural stakes.
- We spend some of our time making things, and some of our time making things happen.
- We actively seek a condition of orchestrated adjacencies: in topics, scales, and methods.
- We presume, always, that technology is never neutral.

Under this manifesto, the Lab accomplishes a wide range of projects. A few examples of projects this research lab has conducted are ramps with kinetic lights, a collapsible podium made for a professor with dwarfism, and an arm/shoulder prosthetic specifically for an engineer in the class who likes to rock climb and bike. The Lab provides a space for students to engage with people with disabilities to break “typical assumptions among young technically minded designers about disability” (Aplusa, 2020).

Phase 2: Lafayette Audit

Phase 2: Lafayette Audit

Introduction

As part of this project, our team has conducted an audit of the projects and research that involve disability studies and design for disability at Lafayette College. Our audit of various disability courses, research, and opportunities has yielded that there are several endeavors and professors with backgrounds either in or adjacent to the disability studies field at Lafayette; however there is a lack of coordination between projects and awareness of each other's endeavors. A recurring theme is there is a lack of a "point person" for the topics that fall under disability studies, and thus faculty and students do not know who to ask in order to find opportunities. After a series of interviews, the topics to follow are (1) what Lafayette is currently doing and (2) what are supplemental opportunities in the works and the knowledge gaps identified.

(1) What is Lafayette Currently Doing

Dr. Michael Nees's Disability Research Background and Classes

Dr. Michael Nees is in Lafayette Psychology's Department and received his PhD from the Georgia Institute of Technology in Engineering Psychology. This background positioned him to teach PSYC 226: Human Factors and Engineering Psychology. "It is not a disabilities focused course but accessibility and issues related to disability are ever-present in that course. It is a course about design and one of the values of good design is inclusiveness and accessibility" (Nees, 2020).

With Dr. Nees' training in Engineering Psychology, he worked in a lab studying auditory perception especially with a focus on auditory displays. This is anything an engineer designs to

make sound in order to inform an audience of something (i.e. the different sounds a phone makes, different sounds a car makes, etc.). Auditory displays also include assistive technologies for people with visual impairments and this was the central focus of the lab. “If vis[ion] is difficult, audio is one way to get information to you” (Nees, 2020). Screen readers is a prime example of assistive technology that will read out information on a screen. “If webpages are designed and coded correctly, screen readers should be able to make the information available to a person who is visually impaired” (Nees, 2020).

Coming from this background, Dr. Nees worked on audio graphs, different tones and melodies that would illustrate information in textbooks from cartesian coordinates. He worked on audio assistive technology since graduate school and has participated in brown bag speaker engagements for the Center of Visual Impairment in Atlanta, Georgia. This was an opportunity for weekly or monthly meetings for different researchers to describe the projects they were working on and receive feedback. Dr. Nees was also “peripherally involved” on projects for the Georgia Academy of the Blind, testing technologies in schools. Just before arriving at Lafayette, Dr. Nees took part in projects in Kenya that historically and continuously have residential programs for people who are blind (Nees, 2020).

When Dr. Nees arrived at Lafayette, he continued to work on audio assistive technologies. He published some pieces and started some projects in this area. At this point, his interest focused on testing accommodations for visually impaired students as it relates to standardized and entry exams (i.e. SAT, LSAT, etc.). Dr. Nees conducted a couple of studies, trying out prototypes, and research with cited undergraduate students at Lafayette. A challenge with continuing this research was that now Dr. Nees did not have access to people with visual impairments locally in the Lehigh Valley and as time passed, he was less connected with his contacts at the Center for

Visual Impairment. Twice he had projects that fell through. He attempted to run focus groups in relation to his interest in standardized tests; he was in contact with a service center for people with visual impairments in Allentown, had an agreement, processed his research request through the Institutional Review Board (IRB), and when this project was ready to start, he did not hear back from the recruiter. In his second effort on this project, he partnered with a teacher in Allentown who had students with visual impairments, but when the project was ready to start, having similarly been processed with IRB, there was only one respondent. Dr. Nees explains that finding individuals who are visually impaired and have taken standardized exams is already a small section of people, but in the Lehigh Valley, he found it to be challenging. At this point, halfway through his “tenure-clock,” Dr. Nees realized he “couldn’t be putting his research efforts into these projects that were fizzling out.” He emphasized that he could adapt his project in a way for the undergraduate students to utilize the prototypes, but in these types of projects, he really wanted individuals with the specific disability (Nees, 2020).

Dr. Nees has continued to write about audio assistive technologies, but in 2017 he started a new endeavor: teaching a capstone course. He was already teaching PSYC 332: Perception, a course on the human senses, which touched on sensory disabilities - namely visual and hearing impairments. In this course, he shows the film *Sound and Fury*, which is about two sets of deaf parents trying to decide if it is the right decision to give their children cochlear implants. “The response I got from students watching that film was really intense and they really wanted to talk about it” (Nees, 2020). At the same time, Dr. Nees was presented with an opportunity to create a new capstone course and the student’s enthusiasm led him to create PSYC 490: Disabilities and Assistive Technologies (See Appendix A for the course syllabus). He has taught it twice now, the first time in Fall 2017, and the response “completely blew [him] away.” It’s a seminar class

where he assigns readings and leads discussions. As a capstone class, the availability is limited to Senior Psychology majors. Dr. Nees explained that the composition of his students included some with disabilities, but most joined because they have never considered this topic before. Dr. Nees described the experience as “transformative” as the class has tackled different controversial areas from the ethical dialogue with cochlear implants to the intersection of disability and reproductive rights (i.e. conversations on abortions, genetic testing, etc.) (Nees, 2020).

Recently, Dr. Nees has reconnected with the Kenya projects he used to work with, now as a paid consultant with an NGO. He is currently examining the accessibility of banking services and has data from people with a wide-spread of disabilities, trying to understand the experience of going to the bank or using banking services online (Nees, 2020).

Dr. Gabel and Dr. Yu’s Department Collaboration

Dr. Lisa Gabel in the Neuroscience Department and Dr. Yih-Choung Yu in the Electrical and Computer Engineering Department are currently working on a brain computer interface. While not inspired from a disability studies perspective, the project is inherently designed for people with voluntary motor control disabilities. They are focusing on severe disabilities, specifically, Amyotrophic Lateral Sclerosis - commonly known as ALS - and Locked-in syndrome where physical activity is limited to “maybe a slight turn of the head and ocular motor activity but nothing else.” The device is intended to utilize signals from the brain to operate the movement of wheelchairs: moving left, right, forward, and stopping. The device, if successful, is also intended for military veterans who are wheel-chair users (Gabel & Yu, 2020).

Before coming to Lafayette, Dr. Yu worked for a medical device company. In his PhD research, he worked on design for an artificial heart. Dr. Gabel’s background is in studying

neurodevelopmental disorders, in which she teaches a class on that. Together, they teach the cross-listed ECE 205/NEUR 205: Human Machine & Advances in Medical Technology. Their co-taught class, Dr. Gabel's first year seminar, and Dr. Yu's Engineering 101 module tend to be a feeder for students into their research projects (Gabel & Yu, 2020).

Additionally, the two have continued to collaborate on a dyslexia project. They have designed a detection tool which can identify individuals with dyslexia even before they begin to read. "This will allow interventions while they learn how to read and they may never display a deficit. As opposed to now, when most kids are not diagnosed until [age] 12" (Gabel & Yu, 2020).

Some students with disabilities migrate to Dr. Gabel and Dr. Yu's lab, but currently they have no students with mobility challenges working on the brain computer interface project. They find students with disabilities tend to be interested in research to better understand that disability. There are no individuals (students, Easton residents, etc.) within the target population - mobility challenges - involved in testing the device because currently the professors believe the device would not be safe for a member of that community to operate it. Regardless, they want to receive feedback from individuals with these disabilities and are in-communication with disabled veterans as well as they read a lot of literature on ALS and Locked-in syndrome to identify the needs. Dr. Gabel's First Year Seminar, FYS 148: Melding Mind and Machine, focuses on the literature (Gabel & Yu, 2020).

Mechanical Engineering

During our conversation with the Hanson Center, it became apparent numerous Mechanical Engineering Professors work on capstone projects in the field of disability and these

projects are not usually limited to Mechanical Engineering students, although the composition is often just Mechanical Engineering students. In the past, Dr. Toby Rossman worked on adaptive technology for students with a range of disabilities to participate in music education (i.e. a recorder adaptation, a keyboard adaptation). This year he is working on a project for students with disabilities and remote learning challenges. Dr. Brent Utter is currently working on a wheelchair project. Dr. Alex Brown, who is also the head of the new BioMechanics concentration, worked on an assistive device for handwriting two years ago for people with motor challenges (Rossman, J., 2020).

Dr. Utter's senior design team, through a two-semester endeavor, is working on an attachment device to wheelchairs that would stabilize the movement of the chairs while on a decline or incline path, specifically those with a grade (slope) too steep for many wheelchair users. The team's website explains the group decided on the project through conversations between each other. They were tasked with a project that was either a medical device or through the use of 3D printers (Motivation, 2020). A team member who asked for anonymity in order to speak more freely explained that the project was specifically inspired by the student group discussing the inaccessibility of Lafayette's campus on College Hill, focusing on the incline up Sullivan Road, from Bushkill Drive to March Field (Doe, 2020). The website discloses that after receiving an IRB approval, the group has interviewed one wheelchair user and the team intends to interview more through the December 2020/January 2021 interim. The website also shares that the team is conducting surveys of healthcare providers "[which] focus on the current difficulties faced when tackling inclines and declines in a wheelchair as well as user interface preferences" (External Partnerships and Stakeholders, 2020). The team member expressed regret for the team not engaging more wheelchair users as well as already having the design in place

before the one interview. They furthered that healthcare providers are not the best equipped to answer questions about wheelchair use since (1) the experience of the devices are either assumptions or second-hand knowledge, (2) the group had difficulty finding wheelchair users to interview due to Lafayette's lack of wheelchair using students, and (3) the constraints of the project itself was not conducive for better community partnership (Doe, 2020). The team member identified that while doing this project through a graded class, students must meet internal deadlines, some of which for the design of the device were before the IRB request was approved (Doe, 2020). The constraints, including cost of the device, were imposed by group members, none of which are wheelchair users themselves, informed from their literature review (Doe, 2020). The group will be releasing the next version of their report, with updates, on December 6, 2020 (Utter, 2020).

Commonalities

The Computer Brain Interface, Dyslexia, and Mechanical Engineering Wheelchair Projects all derive from professor or student interest, rather than from members of the disabled communities themselves. Dr. Nees and the team member of the wheelchair project both identified difficulty in finding participants who are members of the disability community in respect to their specific projects; the latter of which is partially a result of Lafayette student composition. In both cases, the time-scale of the project is not conducive to effective community partnership. *Engineering and Sustainable Community Development* claims, "if engineers are committed to the sustainability of engineering development projects, and to community self-determination through those projects, they must think critically about their motivations, approaches, and relationships to those communities" (Lucena, p. 7, 2010). The authors offer

steps for effective community development. These include (1) self-reflection before and throughout the project, (2) meaningful ways to learn about the community, (3) expanding time-scale, (4) plans for failure, and (5) individual/project assessment (Lucena, p. 106-112, 2010). As Lafayette moves to implement our team's recommendations, those involved in the process need to center projects on assistive technology or the disability community at-large around the voices of the individuals with disabilities as well as practice the steps for effective community development.

(2) Supplemental Opportunities and Knowledge Gap

Disability Speaker Event

On July 10, 2020 Lafayette College announced Professor Temple Grandin of Colorado State University would deliver the keynote speech for Lafayette's Commencement ceremony. One of the reasons Lafayette chose her was because "Grandin is a leading specialist and lecturer on autism, a condition that she has had since birth" (Lafayette Today, 2020). When this announcement came, Erin McKenney '20, felt obliged to let the College know how disappointed she was in the selection. In a letter to the Lafayette President's office, Erin wrote:

"In the middle of a global pandemic, where both disabled people and people with low incomes are particularly at risk, Lafayette College chose an ableist and classist speaker. Dr. Grandin has repeatedly expressed that she does not support disabled people who cannot work. She has insulted their character and their parents' choices, while failing to consider the systemic repercussions of ableism. She has also supported [Applied Behavior Analysis] and special diets to "treat" autism, both of which are highly controversial and largely opposed by the autistic

community. Many autistic people have protested Dr. Grandin’s previous statements and many have been harmed by them” (McKenney, 2020).

In the conclusion of this letter and in the substance of a secondary one, Erin urged the college to host an event led by a disability advocate to counteract the harmful messaging Dr. Gradin’s presence and content of her keynote address imposed on the community (McKenney, 2020).

Erin is currently a PhD student in clinical psychology at Rowan University. Her senior honors thesis at Lafayette was “How timing of accessibility to alternative communication devices in childhood influences well-being and subjective feelings of independence in adulthood among non-speaking individuals”. At Rowan, she is in the process of examining how the obstacles to receive accommodations at colleges are creating heightened levels of stress on students with disabilities and leading to detrimental mental health outcomes. With her background in disability advocacy and adjacent to disability studies, Erin has taken it upon herself to coordinate a speaking event (McKenney, 2020).

She has met with President Alison Byerly and her assistant, Melissa Starace. The inception of the speaking event was that it will occur in November 2020 and focus on ableism and universal design (McKenney, 2020). The coordinators were deciding between Dr. Jaipreet Viridi and Lydia Brown. Dr. Viridi is a Professor at the University of Delaware who teaches about the history of disability perspectives in American society, with a specialty in deaf culture, being a member of the community herself. Mx. Brown “co-leads the project on disability rights and algorithmic fairness at the Institute for Technology Law and Policy at Georgetown University Law Center, teaches for Georgetown University’s Disability Studies Program through the Department of English, and supports the Autistic Women and Nonbinary Network’s public policy advocacy” (Brown). “They have worked to advance transformative change through

organizing in the streets, writing legislation, conducting anti-ableism workshops, testifying at regulatory and policy hearings, and disrupting institutional complacency everywhere from the academy to state agencies and the nonprofit-industrial complex” (Brown, 2020).

The original plan was there would be a Question and Answers segment after the guest speaker with Erin, Dr. Matthew Andler in Philosophy, Marty Sullivan from the Academic Resource Hub, and one more person. The last person was intended to be either Dr. Lauren Meyers or Dr. Michael Nees in Psychology/Neuroscience. Dr. Meyers and Dr. Andler do not have a background in disability. Dr. Andler’s speciality is focused on LGBTQ and gender inclusion, not disability, but their role as the Louise M. Olsted Fellow for Ethics is to spur dialogue through various events as it relates to injustice (Lafayette News, 2019).

“I think one reality that our campus has quite not realized is that we do [not] have anyone on campus who actually does disability studies work.” Erin believes she was invited into this discussion panel because she is the closest thing Lafayette has to someone with a disability studies background, yet she studied psychology and anthropology & sociology. “I am not in disability studies. We should all be a little concerned about that piece” (McKenney, 2020).

The reason the President’s office brought in Lauren Meyers is because they equated a background in child development with developmental disability. When Erin raised that there needs to be a person with a background in neurodiversity (i.e. Autism), the President’s Office took that to mean someone in the neuroscience department. Erin identified there is a bigger need for understanding language on campus, like what the word neurodiversity means. There is a disconnect where when people hear neurodiversity, they believe bringing together people in neuroscience with race and diversity can speak to it. People need to realize the language gap that exists and we need to build an understanding to fill it. This speaking event might be the first

opportunity for the majority of the Lafayette community to engage in this dialogue (McKenney, 2020).

The President's Office was able to secure Dr. Viridi for a lunch talk on Tuesday, November 10th. Dr. Viridi's presentation centered on her new book, *Hearing Happiness*, which examines the curative nature of conversation related to deafness through a historical lens of medical procedures and audio assistive technologies. During her presentation, Dr. Viridi focused on the evolution of assistive technologies and opened the dialogue to the complexity of seeing deafness as a condition to be "fixed." Due to the limited amount of time during a lunch talk, the presentation was followed by questions from this project group, Erin McKenney, and audience members. With a week to advertise, compounded by the difficulty in advertising while the country was waiting for the U.S. Presidential results, the event was extremely well attended for a lunch talk with over 110 attendees, after excluding the people involved in planning, and individuals who were not able to attend had requested access to the video recording. This event helped signify that discussions around disability is a salient topic for the Lafayette community, but also has much enthusiasm.

Hanson Center

Lafayette College's Hanson Center for Inclusive STEM Education and Studies is a recently founded initiative. As of July 2020, Dr. Chawne Kimber of the Mathematics Department and Dr. Jennifer Rossman of the Mechanical Engineering Department became the first directors. There is a physical space dedicated to the Hanson Center in the Rockwell Integrated Science Center and in a non-pandemic academic term, the directors would be utilizing the space. The objectives of the Hanson Center are three-fold: (1) to think about and support students whose

identities have historically been excluded from STEM, (2) supporting faculty to think about how teaching might create barriers that lead to underrepresentation, and (3) looking at curriculum which looks at STEM with perspectives of history, ethnic studies, gender studies, and disability studies - critiquing and contextualizing STEM practices and studies. Dr. Rossman characterizes STEM education as an ecosystem, where in a healthy state, the composition includes people with diversity in identity and everyone is supportive of each other, affirming the inclusivity (Kimber & Rossman, 2020).

Dr. Rossman contends Lafayette's Engineering Studies is currently best positioned to have these conversations. "These students are doing STEM and partnering with others in STEM which is enhanced by looking at STEM through these critical lenses, appreciating the way that STEM is not neutral and socially constructed." She acknowledges there are not many places and classes that take these perspectives; there is a Gender & STEM class, a few first-year seminars, and, unaware of Dr. Nees's course, no disability studies class (Kimber & Rossman, 2020).

One of the issues identified with disability projects is that there are various projects happening, but they are not connected, the groups are not communicating with one another, and the projects are not communicated to the wider college community.

Dr. Kimber explained that for a long time at Lafayette, the idea was that many buildings on the campus were excused from complying accessibility standards since they pre-date the Americans with Disabilities Act (ADA), and therefore, Lafayette took the stance that if a student has a disability, the student should go elsewhere. Dr. Kimber mentioned that these attitudes have changed, specifically over the past few years in the Provost Office, and the Hanson Center now can be utilized as a tool to help speed up change (Kimber & Rossman, 2020).

Dr. Kimber described that the Hanson Center started with a summer program whose goal is to support women in STEM. At the same time, the college hired Professor Mary Armstrong whose expertise was in gender inclusivity in STEM. The campus started looking at new areas of focus: to modernize curriculum and to modernize how the college supports students. Over a three year process, there were several votes from the faculty, who ended up agreeing that inclusive STEM was an important priority. From there, the development office got involved and Heidi Hanson became the central donor for this mission, establishing the Hanson Center (Kimber & Rossman, 2020).

The Hanson Center is currently capitalizing on already existing peer mentoring programs across departments, asking departments to have community-based approaches on their projects, and has the funding for two faculty lines of professors who specialize in intersectionality. The Center is also putting together a universal design training workshop in January 2021 for Lafayette faculty. While the focus will be ADA compliance, the intention is accessibility in education at-large. COVID-19 has made the faculty more aware of accessibility challenges. Dr. Kimber used to be the director of the Center for the Integration and Teaching, Learning, and Scholarship (CITLS) where faculty go for these workshops and hosted training on accessibility. The attendance was less than desirable, but through the COVID-19 moment of reckoning on exacerbated inequality in education, Dr. Kimber hopes it will lead more faculty members to her Hanson Center workshop (Kimber & Rossman, 2020).

Phase 3: Recommendations

Phase 3: Recommendations

This section of our report will include the three recommendations that our team came up with to start discussions around disability studies on Lafayette's campus. All recommendations include different types of improvements to the current system of Lafayette College that will open up channels that will increase the existence of course offerings, research projects and networking opportunities around disability studies.

1) Curricular Improvement: Offering a lower level and interdisciplinary *Disability Studies* course

Our team's Lafayette audit has established different agents on campus who are doing curricular work on disabilities in terms of courses and research. However these courses are major specific and prone to the upperclassmen of these majors. They also focus on specific disabilities, rather than talking about disability studies as an academic discipline. That is why we recommend that *Lafayette offer an introductory course on disability studies* and do so as an *interdisciplinary* course.

Offering an introductory, interdisciplinary, disability studies course will create a space for students and professors who are interested in disability studies to connect with each other and establish a common language on the matter. This way, the introductory course can be a platform to clarify the basics and create a common language within campus which is harder to do with a course that is disability type specific.

Similar courses can be found both at University of Washington (UW) and MIT. UW is offering an Introduction to Disability Studies course that focuses on discussing what disability is

and identities around disabilities (refer to Appendix B for the course syllabus). The course also touches upon discussing policy and laws around disabled people (McDonnell, 2020). Another course is also offered at MIT called Principles and Practice of Assistive Technology (PPAT). This one is a more specialized course that focuses on designing assistive technology with someone who has the specific disability (*PPAT*, 2020). This course is co-taught by six instructors from Mechanical Engineering, Electrical Engineering & Computer Science, and Health Sciences & Technology departments. Both courses have different insights to offer for an interdisciplinary course at Lafayette. UW's course showcases the intellectual base needed for a course and the PPAT course is a great example on how to incorporate the design process into a semester-long course.

Implementation of an introductory course comes with challenges. Currently professors are limited to their departmental obligations in terms of offering a certain number of mandatory courses that departments have to offer their major-specific students. That is why offering disability specific courses either as a capstone or a higher level elective exclusive for students within the major is common. However, breaking these academic barriers to introduce an introductory course is needed for the Lafayette community by laying out the groundwork for more to come. The Hanson Center for Inclusive STEM Education can come into play to bring incentives to overcome these academic barriers. The importance of doing such from within is crucial to tie greater connections between already existing agents at Lafayette, and that's why other forces on campus such as the Hanson Center should lay out an incentive to enable a current professor to offer such a course. Once this course is offered, it can also have an effect on an expansive time scale. This course can be a place where research projects can develop, and feed into higher level classes as well.

The course should be an interdisciplinary course to enable different majors and class levels to take the course and exemplify the interdisciplinary nature of the academic discipline. At its core, this would take the shape of two departments working together to build this course. For example, the two instructors could be from engineering studies and psychology departments that can teach the course together. Higher level electives are only available for students who are upperclassmen of the specific major, which is a small group of students given Lafayette's small campus. An introductory interdisciplinary course brings together students from different majors, thus, different perspectives together, and creates an opportunity for these students to take up 'higher level' opportunities around disability studies later in their Lafayette career. On top of that, disability studies itself requires an interdisciplinary approach to understand the current socio-technical nature of disabilities. For example, from an engineering perspective engineers do have capabilities to design for disabilities. However, they would need sociology and psychology's help to understand how to meet the needs of people with disabilities and how those have not been met historically.

As this course will create a baseline of understanding disability studies on the campus, our team also hopes that it would also bring up the discussion around accessibility of Lafayette's campus. The college being on the hill and some buildings being built before the Americans with Disabilities Act, Lafayette College has a lot of areas of improvement on accessibility. We believe that to build a strong disability studies curriculum on campus, the accessibility of the campus must improve hand in hand to make campus more accessible for disabled students and community partners. Our efforts, including future efforts to come, would not be possible, or appropriate, if the campus is not inclusive of the disabled community by design.

2) Research Power Improvement: Hiring a Professor or a Fellow

One of the obstacles to teaching a disabilities studies course is lack of a professor from disability studies. Dr. Michael Nees might be the most suited given that he has the background on this topic and already teaches a capstone on disability and assistive technologies. Yet, his responsibilities in the courses he already teaches in addition to his research endeavors would certainly stretch his time thin. Moreover, there is a demonstrated need for this conversation to be interdisciplinary and for the faculty member who leads this change, to be willing and able to offer numerous opportunities. Given this need and that a course offering or one-time event would not sufficiently address an ever-evolving field, Lafayette hiring a professor or fellow would facilitate continuous dialogue around disability studies.

Collectively, the Engineering Studies Department and the Hanson Center are in a position to hire three tenured-track faculty members to Lafayette. The background qualifications of any of the new professorships is flexible and could include someone with a background in human centered design, specifically in the disability field - akin to those who work or are trained by the exemplar schools in this report's Phase 2.

Getting new faculty lines is a difficult process and over a faculty member's lifetime is a multi-million dollar investment. Lafayette has planned benchmarks to increase the size of the student faculty and in tandem, increase the size of the faculty proportionately. In this COVID moment, not knowing where enrollment will stand, and with the introduction of a new college President will prioritize the expansion plans, there is uncertainty about what the future of hiring looks like. Engineering Studies Chair, Dr. Benjamin Cohen, explained that due to the college's

financial uncertainty, at best, hiring a tenured-track position through the Engineering Studies Department or the Hanson Center would not happen for several years (Cohen, 2020).

Tenured-track faculty is not the only kind of hiring the college does. According to the Hanson Center, it is quicker and easier to get funding for a position that is more short term, like a Fellow. Currently, Lafayette has Dr. Matthew Andler in the Philosophy department as the Louise M. Olmsted Fellow for Ethics. Part of their charge in their two year role is to foster conversations on campus. They are teaching classes, facilitating workshops, etc. Dr. Andler is currently working on a Race and Racial Justice Series (Lafayette News, 2019).

At Harvey Mudd, there is the Hixon-Riggs Fellow who works on projects which examine the social dimensions of science and technology (*The Hixon-Riggs Early Career Fellowship*). Every one to two years, someone new, generally someone freshly out of graduate school, comes in. This allows the individual to bring new ideas that are current with the moment to foster communication with the community.

Regardless of whether a new faculty member would teach a newly designed class, coordinate events, or launch new research projects, the number one need for Lafayette that this solution would address is determining a point person for all conversations of disability on campus. Developing a research agenda for a small college is challenging, but the first step is having faculty with the expertise and latitude to lay the foundation for future endeavors.

3) **Activities Improvement: Speaker Series/Workshops**

After speaking with several faculty members who have backgrounds in and/or currently do research in disability at Lafayette, we found that we have more resources on campus than we had originally thought. The primary reason that we (and many other people) did not initially take note of the amount of faculty members doing disability work is that few of these faculty members collaborate on their work. While there are professors in engineering, mathematics, neuroscience, and psychology that do some sort of work in the disability field, there is no connection between them. As Dr. Rossman of the Hanson Center had stated, we need someone on campus to establish the “connective tissue” between all of these professors and organizations (Kimber & Rossman, 2020).

As a way to capitalize on the resources that we already have on our own campus and establish the connection between the various faculty members that have an interest in disability studies, we plan to propose a speaker series through the Hanson Center which focuses on the topic of disability studies and disability in engineering. Lafayette professors could use this as an opportunity to speak about their individual research efforts within the disability field. By doing this, the Hanson Center will serve as the liaison between these professors, as well as between professors and students who are interested in disability research. At this point in time, the Hanson Center seems to be the best pathway for us to take in order to truly implement disability studies at Lafayette. By working with them, we plan to start from the ground up; in order to spread knowledge and awareness across campus about disability in engineering - and the lack thereof - it would be beneficial for the Hanson Center to bring in external speakers and hold workshops that relate to the topic and can educate students. As Dr. Michael Nees, Professor of Psychology, had explained to us, many students have never considered what life is like for people with disabilities,

especially on an inaccessible campus like Lafayette (Nees, 2020). Just as his Disability Studies Capstone serves as a discussion-based foundational approach for his students, we would like to provide an opportunity such as a forum for the student population on campus through the Hanson Center.

In order to remain aligned with our original goal of improving engineering for disability, it is important to continue to intertwine engineering research and education within our Hanson Center efforts. As we know, and as many faculty members we have spoken with have mentioned), the most effective way to spark change on a college campus is through the student body. Therefore, we believe it would be beneficial to include our many engineering clubs (i.e. SWE, ASCE, ASME, IEEE, Best Society, AIChE) in these Hanson Center workshops. There are already some workshops in the works. As previously mentioned in Phase 2, Professor Chawne Kimber, co-founder of the Hanson Center and Professor of Mathematics, plans to hold a workshop in January on universal design. This workshop will focus on how design should include more than just the demographic of nondisabled people and how designs can be more accessible to everyone (Kimber & Rossman, 2020). In addition to this, initially proposals from Erin McKenney led to an event that was held in Fall 2020 from a member of the deaf community - Dr. Jaipreet Virdi held the talk “Hearing Happiness” to speak about the history of deafness and systemic oppression against people of the deaf community. Along with this, Erin is also pushing forth efforts to make campus events and speakers accessible to more people. Closed captioning (during virtual events) and sign language interpretation should be mandated for spectators who may have auditory impairments, as they were for Dr. Virdi’s talk.

Because the Hanson Center’s primary focus is holistic inclusive STEM education, and they are an established organization on campus, it would make the most sense for us to take our

capstone project and education reform proposals to them before taking it to the next level. After speaking with some faculty members, we learned that the tenure-track hiring process can take years, and is essentially a several million-dollar investment in a professor. For this reason, the College is likely not going to rush the process of possibly hiring a disability studies professor - our most viable starting point is spreading awareness and knowledge on campus in the hopes that professors and students will begin their own initiatives in disability studies, as we have seen with many other initiatives in the past.

After we had spoken about our proposals with the Hanson Center, our team recalled that each year, the first - year students are required to read a summer reading book. This book often aligns with the interdisciplinary aspect of a liberal arts institution like Lafayette and educates students about current societal issues. Following this, the College brings in the author of the summer reading book as a guest speaker on campus. We hope to work with the Hanson Center to propose that next year's (or another year in the future) summer reading novel is "What Can a Body Do? How We Meet the Built World" by Dr. Sara Hendren. As we have discussed in class, our team is reading this book to educate ourselves on human-centered design and how inaccessible our world is for people with disabilities. We think it would be very beneficial for first-year students to read this book, and for us to be able to bring Dr. Hendren in to give a talk following the assignment. Of course, the entire campus would be invited to this talk, and we hope to have it co-sponsored by the Hanson Center.

Conclusion

Expanding and reimagining what disability studies opportunities Lafayette offers will be a continuous process. This report should not be the final or all-encompassing review of what Lafayette is doing or recommendations to implement. Rather, this report strives to be one piece of more efforts to set a foundation on how Lafayette can proceed moving forward. In the upcoming months, the group members intend to facilitate further dialogue between administrators, faculty, alumni, students, and external partners on how to further integrate disability studies at Lafayette.

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Appendices

Appendix A: Lafayette College PSYC 490: Disabilities and Assistive Technologies

Fall 2018 Syllabus by Dr. Michael Nees.

Appendix B: University of Washington DIS ST 230: Introduction to Disability Studies

Fall 2020 Syllabus by Dr. Joanne Woiak.

PDFs of the Appendices can be found attached to the website.