To: Incoming Chancellor of the University of California, Berkeley; Dr. Na'ilah Suad Nasir Vice Chancellor of Equity and Inclusion; J. Keith Gilless, Dean of the College of Natural Resources
From: Jenna Shelton, UC Berkeley Conservation and Resource Studies Major
Subject: Addressing the Inaccessibility of Research Spaces at UC Berkeley: Fostering Participation of People with Disabilities in STEM Fields

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Executive Summary

This policy analysis explores the problem of inaccessibility on the UC Berkeley campus and especially in STEM fields. Inaccessibility on the UC Berkeley campus is highlighted through evidence conducted from site surveys of agricultural research spaces, analysis of state and federal law regarding discrimination and disability, and qualitative evidence from UC Berkeley students and staff. Methods of analysis for the site surveys include collecting quantitative measurements based on the 2010 ADA Standards for Accessible Design and collecting qualitative data regarding barriers to involvement of people with disabilities within the research spaces. Results of the data showed that the agricultural research spaces did not comply with the access standards or state and federal law. Moreover, evidence from students specifically indicates that physical, financial and knowledge barriers foster exclusion in STEM areas across the UC Berkeley campus. The report also finds that in order to maintain compliance with state and federal law, UC Berkeley needs to implement programmatic changes that provide resources to faculty and staff on how to appropriately accommodate people with disabilities in various educational settings. The report weighs various policy options, but specifically recommends that UC Berkeley implement a program similar to the DO-IT program at the University of Washington to implement universal design in STEM fields and other fieldwork. It also asserts that more impact analysis specific to UC Berkeley needs to be conducted to determine specific costs of universal design to UC Berkeley. Limitations of this report include: missing variables, such as funding for scientific research specifically and number of students with disabilities in each major; forecasting figures are not provided; and the current economic conditions of UC Berkeley is not entirely transparent as not enough information is provided.

I. Introduction

It has been said that "[t]he disability rights movement was born the day [Ed] Roberts arrived on the Berkeley campus" in 1962.[1] Ed Roberts, a wheelchair user with paraplegia, was admitted to UC Berkeley without disclosing his impairment to the university and had to convince university administrators to admit him. Although accessibility was challenging, Ed found

[1] Joseph P. Shapiro. *No Pity: People with Disabilities Forging a New Civil Rights Movement*. Kindle Edition. (Crown/Archetype, 2011), p. 41

alternative ways to access campus through hiring attendants to assist him, which included having friends and attendants carry him up steps. UC Berkeley began to admit other disabled students who led a rebellion for campus equality. The Physically Disabled Students Program (later changed to Disabled Students' Program) was formed and operated (when possible) by disabled students. The program offered wheelchair repair, attendant referral, peer counseling, and other services that would enable UC Berkeley students and employees with disabilities to live in the community and attend the university.

The deep history of disability rights activism championed by Ed Roberts at UC Berkeley, in tandem with the Civil Rights movement, sparked a national disability rights movement and made UC Berkeley an anchor for disability advocacy not just for the city of Berkeley, but for the wider United States. Based in this proud history, UC Berkeley has civic and legal obligations to meet the need of disabled students and provide accessible education and training in every field of study, including agriculture and environmental sciences. Yet UC Berkeley operates agricultural training and educational research facilities that are largely inaccessible to students and volunteers with disabilities, denying them the tangible academic training and practical experience they need for their careers. Without accessible facilities, especially in fields that are directly enmeshed with societal needs and demands that serve the public interest, people with disabilities struggle to develop careers that allow them to participate in public service and scientific research, simultaneously decreasing the production of socially robust knowledge in these fields.

II. The Problem: UC Berkeley's Inaccessible Research Spaces Violate Civil and Legal Obligations to Accessibility

Inaccessibility of Agricultural Research Spaces Disenfranchises Disabled Students

With the rise of disability advocacy at UC Berkeley, UC Berkeley is advertised as an accessible campus and capitalizes on this image. The recent whistle-blowing of non-compliance at UC Berkeley contradicts UC Berkeley's image as an inclusive campus, not only threatening the campus's broader reputation and creating potential legal liabilities, but also disenfranchising UC Berkeley students with disabilities. On the homepage on UC Berkeley's new Equity and Inclusion website, UC Berkeley characterizes itself as the following:

"We strive to resolve systemic inequities for all members of the campus community through engaged research, teaching, and public service, and by expanding pathways for access and success and promoting a healthy and engaging campus climate."[2]

This mission also relates to UC Berkeley's 150-year-old mission as a land-grant institution to support community-led and accessible solutions that produce relevant research and extends knowledge both for the public and for the campus community. Since these missions are guided by diverse involvement, it is crucial that the UC Berkeley administration take the initiative to make research spaces on and off campus participatory and accessible. However, the existence of inaccessible agricultural research spaces demonstrates how UC Berkeley has failed to meet its mission of inclusivity by fostering systemic inequities through an exclusionary built environment.

Since UC Berkeley benefits financially from its reputation as an institution that is able to provide an accessible, quality education for all students, it is only fair that UC Berkeley upholds this ideal. If UC Berkeley, as a pillar for inclusive education and as the top public university in the world, is not meeting the accessibility standards needed to provide a quality education to its students, it undermines the expectation of accessibility at other institutions of higher education as

[2] UC Berkeley Division of Equity and Inclusion. "About Equity and Inclusion." retrieved from: http://diversity.berkeley.edu/about (accessed September 21, 2016).

well. This perpetuates the marginalization of people with disabilities in science, technology, engineering and mathematics (STEM) fields on a wider scale. The inaccessibility of research and training spaces at UC Berkeley, as well as other universities, excludes people with disabilities from participating and receiving training in STEM fields, particularly within agricultural and environmental sciences. The exclusion of people with disabilities in agricultural research spaces not only reflects poorly on UC Berkeley's longstanding reputation as a pillar of diversity and societal engagement, but more importantly it disempowers students with disabilities from participating in scientific exploration and sciences that require research in the field. This decreases the likelihood that people with disabilities more generally will be involved in agriculture and other STEM fields.

As a result, UC Berkeley is perpetuating inequity within its institution and is maintaining exclusion within the wider professional world of science by not providing inclusive participation in research spaces, in turn, blocking access to experiential learning opportunities for people with disabilities that would otherwise allow them to pursue a career in STEM fields. To deny people this right to education and opportunity on the basis of disability is unjust, regressive, and illegal.

III. Disability Legislation and Non-Compliance at UC Berkeley

Federal and State Access Laws Applicable to Public Universities

At the federal level, UC Berkeley is bound by the Americans With Disabilities Act of 1990.[3] In particular, the ADA features access guidelines, which should be referenced when entities aim to design, construct, and alter both indoor and outdoor facilities.[4] The Americans

[3] Titles I, II, III, and V of the Americans With Disabilities Act of 1990 are codified in Title 42, chapter 126 of the United States Code.

[4] United States Access Board. "ADA Accessibility Guidelines." retrieved from: https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/adaag#purpose (accessed October 28, 2016)

With Disabilities Act is also the primary civil rights legislation that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, transportation, educational institutions, and all publicly-owned and privately-owned places that are open to the general public.[5] Although the Americans With Disabilities Act does not specifically address accessibility requirements for agricultural and scientific research spaces, disability accommodations still apply to these spaces on the basis of being educational areas and recreational areas open to the public and operated by an institution that receives federal funding. As a result, the agricultural research spaces of the UC Gill Tract, the Student Organic Garden, and the Oxford Tract must meet ADA requirements, including public accommodation. Depending on the particular space, these sites are used for university courses, practical agricultural skills training, student research projects, and university-supported recreational farming for students and/or community members.

Under the law, public and private entities, including UC Berkeley, that serve the public must provide reasonable public accommodations. Reasonable accommodation includes "...making existing facilities used by employees readily accessible to and usable by individuals with disabilities; and [in the case of employment includes] job restructuring, part-time or modified work schedules, reassignment to a vacant position, acquisition or modification of equipment or devices, appropriate adjustment or modifications of examinations, training materials or policies, [and] the provision of qualified readers or interpreters, and other similar accommodations for individuals with disabilities"[6] Reasonable accommodations are particularly

[5] The National Network. "What is the Americans with Disabilities Act?" retrieved from https://adata.org/learn-about-ada. (accessed October 20, 2016).
[6] U.S.C. § 12111(9) (A-B)

applicable to situations of employment. Thus, if UC Berkeley faculty, staff, and GSIs with disabilities wish to use the spaces, accommodations must be made to enable them to fulfill their duties. Reasonable accommodations must be available to people with disabilities that allow them to access services, unless the accommodation distinctly imposes undue hardship for the business or institution.[7] Specifically, Title III of the ADA states that "goods, services, facilities, privileges, advantages, and accommodations shall be afforded to an individual with a disability in the *most integrated* setting appropriate to the needs of the individual." Public accommodations at UC Berkeley must comply with basic nondiscrimination requirements that prohibit exclusion, segregation, and unequal treatment on the basis of disability.[8] In some cases this goal can be achieved through making reasonable accommodations, but in order to guarantee the most integrated experience, more permanent changes that remove barriers to accessibility must be implemented over time.

Title III is also supported by the Rehabilitation Act of 1973, which prohibits discrimination on the basis of disability in programs conducted by federal agencies and in programs receiving federal financial assistance.[9] Specifically, Section 504 of the Rehabilitation Act states that "no qualified individual with a disability in the United States shall be excluded from, denied the benefits of, or be subjected to discrimination" under any program or activity that receives federal financial assistance.[10] As a land-grant institution UC Berkeley receives federal funding for agricultural and scientific research spaces under the Morrill Act and is

[7] U.S.C. § 12111(10)(A-B)
[8] U.S.C. § 12182 (1)(B)
[9] U.S.C. § 794 (a)
[10]U.S.C. § 794 (a)

therefore, directly responsible for maintaining accessible and integrated research spaces through making reasonable accommodations.

At the state level, California has multiple policies that affect accessibility on college campuses and reiterate laws that denounce segregation on the basis of disability. For example, the Unruh Civil Rights Act is a state law which echoes the ADA in that it prohibits discrimination on the basis of disability, but it also prohibits discrimination on the basis of sex, race, color, religion, ancestry, national origin, medical condition, genetic information, marital status, sexual orientation, citizenship, primary language, or immigration status".[11] Additionally, the California Civil Code explicitly states:

"Individuals with disabilities shall be entitled to *full and equal access*, as other members of the general public, to accommodations, advantages, facilities...places of public accommodation, amusement, or resort, and other places to which the general public is invited, subject only to the conditions and limitations established by law, or state or federal regulation, and applicable alike to all persons."[12]

As such, UC Berkeley is bound by California and federal law to uphold full and equal access to campus spaces that are open to the general public. Since two out of three agricultural research spaces owned by the University of California are open to the public—the UC Gill Tract Community Farm and the Student Organic Garden— the University of California, Berkeley is liable for ensuring that these agricultural research spaces are compliant with both the ADA and California Codes regarding accessibility and discrimination and be prepared to provide a reasonable accommodation if needed.

[11] California Civil Code § 51
[12] California Civil Code § 54.1 a(1)

Similarly, California Government Code Section 11135 outlines that full and equal access need to be maintained by public entities, even public college campuses by stating:

"No person in the State of California shall, on the basis of...disability, be unlawfully denied full and equal access to the benefits of, or be unlawfully subjected to discrimination under, any program or activity that is conducted, operated, or administered by the state or by any state agency, is funded directly by the state, or receives any financial assistance from the state. Notwithstanding Section 11000, this section applies to the California State University."[13]

This particular section of the California Government Code is applicable to the University of California, Berkeley because, as mentioned previously, the University of California is a public land-grant institution that receives federal and state funding under the Morrill Act and Hatch Act for agricultural and scientific research. In particular, the Hatch Act of 1887 granted funds to each state to establish an agricultural experiment station connected with a land-grant institution and mandates that the federal funds must be matched by the state, which is determined for each state through a formula based on the number of small farmers in each state.[14]

Since all three of the agricultural research spaces are designated to receive federal and state monies for research and education, all three spaces are liable to state and federal law regarding public accommodations that maintain full and equal access. Furthermore, if it is determined that a grantee, in this case the University of California Berkeley, has violated the provisions of the California Government Code, the state agency that administers the funding has the ability to curtail state funding in whole or in part to the university.[15] Thus, if the University of California is found to be in violation of state law regarding campus accessibility within campus-owned agricultural spaces, there is the possibility that the university could lose funding for

[13] California Government Code § 11135(a)
[14] Association of Public and Land-grant Universities. "The Land-grant Tradition." *APLU* (Washington, DC: 2012) retrieved from: http://www.aplu.org/library/the-land-grant-tradition/file
[15] California Government Code § 11137

research and efforts in STEM fields, exacerbating UC Berkeley's financial deficit and potentially jeopardizing the quality of education and training opportunities for UC Berkeley students and community members who use these agricultural spaces.

Site Surveys of UC Berkeley's Agricultural Research Spaces

Over the last year I have conducted site surveys with research assistants at the Student Organic Garden, the UC Gill Tract Farm, and the Oxford Tract, to examine the barriers within agricultural spaces that prevent accessibility to people with disabilities. The site surveys consisted of taking measurements of pathways and garden beds, examining ground durability and crop layout, inspecting signage, and obtaining information on resources used within the spaces to accommodate a wide variety of impairments, including sensory, physical, and cognitive. I also conducted qualitative interviews with people who manage the space in order to gain a better understanding of the pitfalls of accessibility within the garden and farming spaces. From my observations I conclude that there are three main barriers to achieving accessibility within agricultural research spaces: physical, financial and knowledge barriers.

Physical barriers are the most evident example of how people with disabilities are excluded from participating within agricultural research spaces and science-based spaces operated by UC Berkeley. At the Student Organic Garden, for example, the width of pathways in between garden beds ranged from 14.5-30.5 inches, far less than the expected 36 inches established by the Americans with Disabilities Act Access Guidelines.[16] In comparison, the pathways between garden beds in the spiral garden of the UC Gill Tract ranged between 30-45.75 inches, with some pathways narrowed by blockages, which can be seen in Figures 1, 2,

[16] 2010 ADA Standards for Accessible Design § 403.5.1

and 3 below. Although the UC Gill Tract is better at meeting the pathway entrance width of 36 inches in a few of its spiral garden pathways, the width of some spiral garden pathways is shortened by logs used to create beds for herbs[17] and by poles used to support netting for pest control.[18] Both of these design flaws subtract from the overall width of the pathways, making them more difficult to navigate for people with mobility impairments. Additionally, the width of garden rows at the Gill Tract are inconsistent and can therefore be difficult to access because it is difficult for people with mobility impairments to navigate throughout the rows.

Comparatively, the pathways in the Oxford Tract fields are narrow and are in violation of the 36-inch width for pathways set by the ADA Access Guidelines. Furthermore, while the Oxford Tract buildings are accessible to people with mobility impairments, the main entrance to the field of the Oxford Tract does not have a ramp, making it only accessible to people who can navigate over curbs. Therefore, wheelchair users would have to use the entrance made for large tillers and machinery, creating a dynamic that segregates participants with disabilities from people without disabilities. Although the Oxford Tract does have relatively even ground around the field that is used for navigation, the rest of the field rows are inaccessible and accommodations are nonexistent. There are no raised beds and disability accommodations within the field itself are not provided. While progress has been made towards the accessibility of the greenhouses and lath houses, physical accommodations that are readily achievable should also be an option for students with disabilities who want to participate in fieldwork in the Oxford Tract. The accessibility of the lath houses and greenhouses do not compensate for the inaccessibility and lack of accommodation in the field of the Oxford Tract.

[17] See Fig 1
[18] See Fig. 2 and Fig. 3

In terms of accessible gardening techniques, specific height requirements for raised garden beds can be seen in Table 1 below.[19] The UC Gill Tract has three raised beds and the Student Organic Garden has four raised beds, but the average height of raised beds in each garden does not meet height requirements for wheelchair users or volunteers with limited mobility, as shown in Table 2 below.[20] The calculations for raised beds in the Student Organic Garden were two beds with a height of 14.5 inches, one bed with a height of 13.75 inches, and one bed with a height of approximately 8 inches.[21] In contrast, the UC Gill Tract has three raised beds, two of which have a height of 21 inches and one with a height of two feet. Even though the raised beds at the Gill Tract generally meet height guidelines for accessibility, the raised beds were placed in a the children's area of the garden, which is not only difficult to get to for people with limited mobility, but could be perceived as infantilizing people with disabilities. Despite genuine and well-intentioned attempts at accessibility, guidance regarding ADA accessibility is certainly needed.

Moreover, UC Berkeley's agricultural research facilities are violating appropriate signage requirements from the 2010 ADA Access Guidelines. Proper signage near entrances are required to include raised characters or braille.[22] Although having braille on signs may seem like a small issue, it is one of many tools that is used to help people with visual impairments navigate the space. Since all of the spaces are lacking braille on signs, it maintains a barrier for people with visual impairments to access the space and contradicts the ADA Accessible Design Standards. Violations of the ADA Accessible Design Standards should be a serious concern for UC

[19] See Table 1 in Appendix
[20] See Table 2 in Appendix
[21] Unlike the other raised bed, the 8-inch raised bed was made out of netted straw, resulting in a lower height.
[22] 2010 ADA Standards for Accessible Design § 216.2

Berkeley, considering that both the Student Organic Garden and the Gill Tract serve the wider community. The Gill Tract in particular has volunteers from the East Bay Center for the Blind.[23] As such, UC Berkeley is liable for not only accessibility for students in these spaces, but is also responsible for access of community members because both the Gill Tract and the Student Organic Garden serve the general public. Ultimately, more assistance from the university is required to help standardize entrances, pathways, and other physical components to make agricultural research spaces more accessible.

Despite their inability to fully satisfy ADA access guidelines and facing financial constraints, operations managers at the UC Gill Tract, the Oxford Tract, and the Student Organic Garden recognize the importance of creating accessible spaces and have also made tremendous accomplishments in accessibility through creating clearer, more durable pathways, incorporating diversified farming techniques that stimulate the senses, having resources for people with hearing impairments, using different types of garden beds, and reaching out for accommodation assistance. Some of these modifications, such as using different alternatives to ground planting can be seen in Figures 4 and 5 below.[24] These are small but promising steps to diversifying scientific research through fostering accessibility, but it should not be the sole responsibility of staff to improvise accommodations on their own. Rather, as an institution UC Berkeley can work to strategically implement sustainable farming methods to create more inclusive gardening and farming spaces; some examples of this can be seen in a report from Grassroots Gardens of

[23]Jon Hoffman (UC Gill Tract Manager) in an interview by Jenna Shelton. Berkeley, November 6, 2016.
[24] See Figures 4 and 5

Buffalo and in Table 3 below.[25] It is also important to note that these modifications are generally helpful for all people regardless of age or ability.

Most attempts within the agricultural research spaces of using sustainable farming as a tool to make spaces more accessible have been pursued without clear support and direction from UC Berkeley compliance officers, making it difficult to properly execute ADA requirements without guidance and compliance assistance from university administrators. Therefore, implementing accessibility in these spaces is not a problem for managers of agricultural research spaces, but rather it is an issue with the unresponsive administration, and sometimes faculty, that do not prioritize accommodating people with disabilities in research farm fields.

Financial barriers should also be considered. Although the agricultural research spaces strive to increase accessibility, the research spaces face considerable financial constraints that prevent them from pursuing change. For example, both the UC Gill Tract and the Student Organic Garden receive most of their funding from an unreliable patchwork of small grants. Aside from the land that the Student Organic Garden receives from UC Berkeley, most of the funding from the Student Organic Garden is received from unaffiliated grants and fundraising.[26] It is difficult to fund ADA accommodations while funding for these spaces is not guaranteed. Funding is also a concern for the Oxford Tract. To use the Oxford Tract, researchers pay for recharges that allow them to use the Oxford Tract facilities for experimentation; researchers have to pay for their own accommodation needs within the space. Even if a department is willing to

[25]"A Guide for Making Community Gardens Accessible for all Members" Grassroots Gardens of Buffalo, accessed September 2, 2016, http://www.grassrootsgardens.org/uploads/2/6/3/8/26383225/a_guide_for_making_community_gardens_accessible_for_all_members.pdf, see Table 3 below for more guidelines

[26]Hayley Davis (Student Organic Garden Programs Manager) in an interview by Jenna Shelton. Berkeley, October 2, 2016.

make accommodations, the cost will come out of its limited funds, thus discouraging intervention. The same standard also applies to classes that use the Oxford Tract. Accommodation expenditures for students with disabilities using the Oxford Tract as a part of a class is expected to be taken from the class budget or paid for by the students, disincentivizing making accommodations in these spaces if it is taken out of the class budget.[27] Funding concerns paired with administrative pushback is a primary barrier to accessibility in these spaces because the administration at UC Berkeley use funding constraints as an excuse for not prioritizing the participation of disabled students in scientific fields:

"[Inaccessibility] is a [result of the] combination of funding and administrative barriers; there is very little money available to make these ideas into reality. Since the [UC Gill Tract] land is 'leased' through CNR, and CNR views themselves as squatters on University land, there is very little support to advocate for long-term upgrades like ADA-accessible toilets… CNR [and] the University are not interested in upgrading the facilities. The same idea applies to on-site ADA-accessible parking close to the planting rows – since the Farm does not have a defined number of years or specified contract to use the land, little support exists to raise funds to carry out such [long-term] projects. [T]here is very little leadership at the Farm that understands accessibility issues from a first-hand perspective so it could be that there is a lack of awareness or understanding of these issues to inform the physical design of the space and priorities these issues."[28]

As a public, federally-funded institution, UC Berkeley has a legal obligation to prioritize both "full and equal" accessibility for people with disabilities and collaborate with the community to create research that serves public interest, but currently receives little assistance from UC Berkeley in making the spaces more accessible. A recent example is how the UC Gill Tract spent upwards of $1000 of their grant funding to rent an ADA accessible bathroom for a year (from October 2016-October 2017) in an attempt to compensate for the inaccessible restrooms that UC

[27]Tina Wistrom (Oxford Tract Manager) in an interview by Jenna Shelton. Berkeley, October 21, 2016.
[28]Katie McKnight (Former UC Gill Tract Fellow) in an interview by Jenna Shelton. Berkeley, October 13, 2016.

administration refused to modify for accessibility.[29] Similarly, the Student Organic Garden has attempted to create raised beds, but none of the beds meet the height requirement needed for wheelchair users to use them. Due to the strained budget and resourceful attitude of the Student Organic garden, netted straw instead of wood is used to make raised beds, which compromises the structure and height of the bed, making it less accessible overtime. With more support the Student Organic Garden could purchase raised beds that meet height requirements for wheelchair users. There is a clear disconnect between the accommodation goals of the garden managers and the goals of the UC Berkeley administration. In order to align with its mission, UC Berkeley administration need to facilitate financial assistance and institutional training initiatives to address the inaccessibility of these spaces. Furthermore, failure to address inaccessibility within these research spaces not only harms students: inaccessibility excludes members of the community from participating in the research spaces, which also contradicts UC Berkeley's land-grant mission of publicly relevant research.

While physical and financial barriers are perhaps the most obvious barrier to accessibility, they are not the most pervasive. The inability or unwillingness to accommodate people with disabilities in these spaces stems from the lack of knowledge about providing accommodation within these spaces and throughout UC Berkeley in general. The farm managers of all agricultural research spaces are willing to accommodate people with disabilities in the space, but lack the knowledge needed to make appropriate accommodations, or are unaware that an accommodation is needed. In the case of the Oxford Tract, Operations Manager Tina Wistrom explained:

[29]Jon Hoffman (UC Gill Tract Manager) in an interview by Jenna Shelton. Berkeley, November 6, 2016.

"Professors manage accommodations and they make decisions on how accommodations are handled. People have been able to provide accommodations without having to bring it to my attention. I haven't really encountered a situation where people need a modification. But accessibility is important to [Oxford Tract] operations."[30]

Therefore, the Oxford Tract Manager does not receive any training that deals with disability accommodation or working with people with disabilities. However, she is more than willing to foster accessibility within the space, especially because having ground level access to the Oxford Tract buildings is crucial to the operations of the Oxford Tract as it ensures that physical movement of materials from the greenhouses to the Oxford Tract field is possible.[31] The same attitude and willingness to accommodate people with disabilities are also present in Gill Tract and the Student Organic Garden managers. Both gardens have been attempting to make changes to the space that make it more accessible, but have difficulty reaching out to UC staff who have the institutional knowledge of creating accommodations in these spaces. As a result, I, as a student with a disability, have been responsible for being a liaison regarding accommodations in these spaces. However, it should not be the sole responsibility of a student or community member to provide resources regarding accessibility. There is a clear issue of the siloing of institutional knowledge about accommodation that is not being diffused throughout the UC campus. At the same time, it cannot be the sole responsibility of the Disabled Students' Program at Berkeley to drive access in these spaces, as it would also be unproductive given recent circumstances of non-compliance and mismanagement. Instead, the responsibility rests on UC Berkeley as an institution, not the Disabled Students' Program, to provide participatory accommodations in these spaces.

[30]Tina Wistrom (Oxford Tract Manager) in an interview by Jenna Shelton. Berkeley, October 21, 2016.
[31] Ibid.

Additionally, this lack of knowledge about disability at UC Berkeley broadly extends to UC Berkeley faculty and perpetuates the unwillingness of faculty to involve students with disabilities in agricultural research spaces with their non-disabled classmates. As Ben Perez, UC Berkeley Campus Access Specialist explains:

"It's rare that students with disabilities acquire accommodations within [agricultural research] spaces, but a lot of that is because they are discouraged to participate. The physical barriers exist, but the larger issue is the willingness to adopt alternatives… Faculty don't receive very much sensitivity training for working with students with disabilities. Accessibility of research spaces needs to be addressed in tandem with responsibility of sensitivity training. Disability is not something that is widely acknowledged."[32]

The unwillingness for staff to make accommodations due to lack of knowledge and understanding around accommodation can be specifically exemplified in my own experience as a student with a disability trying to participate in practical agricultural training in the Oxford Tract. I started gardening at age six when I was in a wheelchair. After I had chosen an emphasis in equitable food systems in college for my Conservation and Resource Studies major, I enrolled in an agroecology course that included field-work at the Oxford Tract in August 2015. Since I am no longer a wheelchair user, I thought my participation would not be hindered by inaccessibility. However, the garden rows were narrow and difficult to walk through because there was string to step over around each plot. My garden plot was also in the middle of the overall field and each garden plot had string around them, making it difficult for me to navigate the field. When I reached out to DSP, they did not know how to accommodate me in the space and suggested that I be provided a separate assignment in a greenhouse, which violates accommodation requirements of the Disabled Students' Program, as they cannot tell students to accept different treatment.

[32]Ben Perez (Campus Access Specialist at UC Berkeley) in an interview by Jenna Shelton. Berkeley, October 24, 2016.

Since I felt that their proposed accommodation was isolating, I denied this accommodation after realizing that I did not have a set assignment and would be working by myself.

I wanted to participate with my classmates, so I suggested that the string around the plots be removed. My professor's response was that there was really no point in making physical changes, even removing string, because we would be finished in two and a half months. The professor also mentioned that my peers for the group project should help me navigate the Oxford Tract beds. The issue with this approach is that to infer that my peers should be responsibility for my accessibility needs is burdensome, inhibits my personal autonomy, and does not fix the overall issue of accessibility in the space. In order to address this issue, a GSI in the course agreed to make changes to the plot that were not approved by the professor, but these changes were slow and could not be anything too obvious, making it hard for me to find a way to contribute to my group.

After not receiving clear guidance from my professor, I sought more support from the campus's disability compliance officer. In terms of disability services, the disability compliance officer targeted the GSI who was trying to help me, instead of talking to the professor, which made the GSI nervous about his job after he had been attempting to make changes to the plot without the knowledge of the professor. I also tried contacting DSP for further support and they were unable to help because they cannot provide specific accommodations for altering the geography, even temporarily, or finding specific alternatives. From my experience, the professor did not know enough about disability to make accommodations; he did not know how to properly work with disabled students, nor did he understand why fostering inclusive participation for people with disabilities is important.

Additionally, the lack of understanding regarding disability portrayed by UC Berkeley faculty is not solely applicable to my experience, but is also experienced by other disabled students in sciences as well. Below, a Society and Environment major reflects on their experience conducting research at the agricultural spaces:

*"*From being in [agricultural research] spaces, I can see that they do not keep up with disability compliance and it creates a lot of barriers to access. I think it that has to do a lot with social construction of who we see as a part of agriculture. We use funding for supplies rather than accessibility within these research spaces. While supplies are important, I think it is also important to promote equity and inclusion on campus. On a personal level, there have been experiences in my education where I feel uncomfortable because the environment is physically or socially inaccessible, making me question whether or not I belong in science. "[33]

The inability of UC Berkeley administration and faculty to value the significance of disability accommodation makes it significantly more difficult for people with disabilities to pursue science-based majors and careers because students feel as though they do not belong in the space or that they are burdening their professor or classmates when voicing concern about their ability to participate. Negative attitudes are not just reflected in the agricultural research spaces, but are also reflected in courses that are needed to declare majors in areas of science. For example, students have experienced marginalization in lower-division courses that are required for science-based majors in CNR:

"I switched majors from MEB [Molecular Environmental Biology] to History because I couldn't get the accommodations I needed for my chemistry class– note-taking in particular. I failed the class because the notes were bad. When I went to the professor's office hours, he told me to go talk to DSP. As a first year I didn't realize that I could go into DSP and file a complaint about the notes, I didn't know it was an option and I couldn't get the help I needed from the professor, so I dropped out of [the College of Natural Resources] … I wasn't able to pursue science because the accommodations and resources were not there."[34]

[33] Meralina (UC Berkeley Students and Researcher) in an interview by Jenna Shelton. Berkeley, September 28, 2016

[34] UC Berkeley Student in an interview by Jenna Shelton. Berkeley, November 11, 2016.

While students with disabilities should be advocates for themselves, they can only do so if they are aware of the resources that UC Berkeley makes available to them and if they know their accommodations in a particular area of study. Part of the solution is to provide student orientations for students entering the university, which has been proposed by the Vice Chancellor of Equity and Inclusion. However, this does not address the issue that some students are not aware of the accommodation needs and options for their field of study. For example, students participating in field research or in a lab for the first time may not know that they need modified tools or other accommodations until they reach the field site, in which case ordering the necessary tools and having different accommodation strategies to maximize participation should be readily achievable. Accommodations must be known and provided in advance of the course to ensure that participation is achievable at the start of the class. Preferably, there should be enough time prior to taking the course or research project to design and have their required accommodations in place. Faculty and staff should also have a general idea of where to direct students receiving disability services and be able to adapt to the needs of reasonable accommodations in the classroom while the student seeks appropriate accommodations.

Disability is also intrinsically taboo and misunderstood both within society and on the UC Berkeley campus, causing unwillingness or apprehension from faculty and research specialists to effectively accommodate students with disabilities in educational and research spaces. It is this unwillingness that perpetuates the idea that people with disabilities are not viable research assistants, which prevents students from accessing practical scientific knowledge, especially within the area of agricultural science. For example, UC Berkeley has research programs for students including Student Proposed Undergraduate Research (SPUR) and the Undergraduate Research Apprenticeship Program (URAP), but many of these projects require

hand-on experience and it is often difficult to get accommodations for disabled students in these programs. The ability to accommodate students also depends on the willingness of research supervisors to work with research assistants with disabilities and find an appropriate accommodation.

However, the tremendous variety in disability not only among different types of impairments (i.e. physical, sensory, and cognitive) but also within specific disabilities results in apprehension for research specialists and faculty to make accommodations. Additionally, the severity of an impairment can differ within a disability. This variance can be seen in Table 4 below.[35] For example, there are four different types of cerebral palsy– monoplegia, diplegia, hemiplegia, and quadriplegia– that may need different accommodations. This variance in severity can also occur within sensory and cognitive impairments. For example, while some people with visual impairments do not have the ability to see, other people with visual impairments may have some visual ability and are classified as having low vision. Cognitive impairments also have wide variability in that they can impact language, memory, and behavior, which may need different accommodations as well. People can also have more than one impairment and some impairments are degenerative while others are remain constant. Considering the great diversity within disability, it is likely that impairments will vary from person to person and that accommodations will vary as a result.

Since disability is not widely discussed in academia, not much is known about accommodating people with disabilities in different academic and research fields. The wide range of variety in disability also makes it daunting to address accommodation partly because

[35] See Table 4

those involved in research do not know enough about making practical and effective accommodations that can help more than one person. In order to properly execute accommodations for people with disabilities and include people with disabilities in scientific fields, faculty, cooperative extension specialists, and operations managers of research spaces need to know basic information about disability and accommodation. Although the complexity of disability may seem intimidating and contribute to an unwillingness to accommodate, apprehension about accommodation can be dispelled through gaining knowledge. However, knowledge about disability is not being disseminated throughout different fields at UC Berkeley. Thus, the lack of knowledge regarding disability can manifest itself across campus disciplines in actions that patronize disabled students and make them uncomfortable in academic spaces often through the unintentional denial of privacy and denial of a person's right to accommodation. For example, many science and non-science majors at UC Berkeley also require prerequisite math courses, which have their own accommodation issues as well:

"In my Pre-Calculus course, the professor told me in front of the class to stay behind to take my quiz, which was really embarrassing because everyone knew I got an accommodation. I feel a lot of judgment by my peers. My accommodations in the class were also not met. I have an accommodation for minimal distraction, but I was put in a tiny copy room for a time-and-a-half accommodation when I went to take the quiz. There were people coming out and super loud; it impacted my ability to do well on the test."[36]

This is not the only example of educators not knowing how to appropriately accommodate students. Often times, it is up to the discretion of the professor where students who need accommodation. In this particular case, what was considered a low-distraction environment to the professor was not a low-distraction environment for the student. Aside from accommodation

[36] UC Berkeley Student in an interview by Jenna Shelton. Personal Interview. Berkeley, November 11, 2016.

concerns, unprofessional attitudes regarding disability extend beyond STEM fields at UC Berkeley.

Although inaccessibility is most obviously seen in physical barriers in agricultural spaces, it must also be recognized that inaccessibility is a campus-wide issue that is perpetuated by the lack of faculty and staff knowledge about disability and accommodation procedures. In many of these anecdotes from students it is obvious that professors do not know how to appropriately address or accommodate students with disabilities. Thus, campus-wide solutions must be implemented in order to address the scale of inaccessibility on campus; information on accessible and inclusive practices in both classrooms and research spaces needs to be disseminated throughout campus.

In order to mainstream accessibility and inclusivity, the University of California must foster understanding about people with disabilities and make a tangible effort to include them both physically and socially in academic and experiential learning environments. While removing physical barriers is a long-term goal and should be actively pursued, it is imperative that, in the short-term, faculty and staff know how to provide assistance and resources to people with various disabilities who want to participate in agriculture and other scientific fields. Before physical hurdles can be permanently removed, the University of California Berkeley must first address the knowledge and administrative barriers to accommodating people with disabilities in field spaces. Then the university must follow through with a plan to build inclusive research and training spaces.

IV. Policy Alternatives

After careful analysis and research throughout this past year, I have selected three policy alternatives as mechanisms to best address the inaccessibility of agricultural research spaces at

UC Berkeley. The first alternative is to let the current trends continue. If this alternative is pursued, UC Berkeley fails to address the inaccessibility of agricultural research spaces, limiting experiential learning opportunities for students and community members with disabilities. The second alternative is to use federal land-grant funding to support disability services for students and community members participating in scientific research as it supports the community. In effect, this alternative would help research spaces overcome the cost of reasonable accommodations in the agriculture research stations. The third alternative is for the UC Berkeley to implement a program similar to University of Washington's DO-IT program, which provides sensitivity training and resources for faculty to institute universally accessible design in classes and research and engage students with different education needs.

Alternative 1: Let Current Trends Continue

As an alternative, letting current trends continue would maintain the various barriers of accessibility in research spaces. Although UC Berkeley is attempting to address concerns regarding noncompliance, it is unclear whether noncompliance in research spaces is a primary consideration. In terms of disability access, UC Berkeley has a history of using a reactionary instead of a precautionary approach to address disability compliance within the institution. One prominent example of is UC Berkeley failing to make online content available to people with hearing impairments after being investigated by the Department of Justice and found non-compliant.[37] Instead of adjusting the courses to make them accessible, Cathy Koshland, Vice

[37]U.S. Department of Justice. "The United States' Findings and Conclusions Based on its Investigation Under Title II of the Americans with Disabilities Act of the University of California at Berkeley, DJ No. 204-11-309" retrieved from: https://news.berkeley.edu/wp-content/uploads/2016/09/2016-08-30-UC-Berkeley-LOF.pdf (accessed October 21, 2016)

Chancellor for Undergraduate Education, said that the university is leaning towards cutting the program entirely:

"We believe that in a time of substantial budget deficits and shrinking state financial support, our first obligation is to use our limited resources to support our enrolled students. Therefore, we must strongly consider the unenviable option of whether to remove content from public access."[38]

Thus letting current trends continue would only maintain this reactionary principle that responds to short-term concerns in a time where precautionary measures are needed that maintain long-term accessibility, especially given that over the last four years there has been an annual 23% rise in students eligible to receive disability services at UC Berkeley.[39]

Alternative 2: Use Land-Grant Funding to Support Disability Support Services for Students and Community Members in Research Spaces

Another potential alternative is to use a small portion of land-grant research funding to make disability accommodations and improve overall accessibility. From 2014-2015, UC Berkeley received at least $21.5 million in federal funding for agricultural services and education.[40] UC Berkeley also receives funding for agriculture from the State of California and from private funders. Since the funding is allocated to UC Berkeley as a land-grant institution, it is imperative that UC Berkeley uphold its land grant status by providing accessible resources and tangible training to the people Alameda County, about 10% of whom have disabilities.[41]

[38] Public Affairs, UC Berkeley."A statement of online course content and accessibility" UC Berkeley. retrieved from: http://news.berkeley.edu/2016/09/13/a-statement-on-online-course-content-and-accessibility/ (accessed November 25, 2016).
[39] Paul Hippolitus (former Director of Disabled Students' Program), in a retirement message over email to Jenna Shelton, September 19, 2016.
[40] National Science Foundation. "Higher Education Research and Development Survey Fiscal Year 2015." Data Table 39 retrieved from: https://ncsesdata.nsf.gov/herd/2015/html/HERD2015_DST_39.html
[41] U. S. Census Bureau. (2015). *American FactFinder fact sheet: Alameda County, CA.* accessed November 25, 2016. retrieved from:

Creating universally accessible resources is beneficial for disabled students and non-disabled students alike and it also helps to fulfill needs of the community through providing hands-on experience to disabled community members, parents with kids, elderly individuals, and school-age children. Thus this alternative would works towards reducing liabilities in the long term and maintaining equity and inclusion on campus.

Alternative 3: Develop and Maintain Accountability to an action plan for building universally accessible classrooms and field sites

UC Berkeley administrators should also consider how they will address inaccessibility concerns over time through achievable programmatic changes. As such, a long-term solution would be for UC Berkeley to develop and maintain accountability to an action plan or program for building universally accessible classrooms and field sites. A practical example of such a program is the DO-IT (Disabilities, Opportunities, Internetworking, and Technology) program at the University of Washington, which "promotes awareness and accessibility—in both the classroom and the workplace—to maximize the potential of individuals with disabilities and make our communities more vibrant, diverse, and inclusive."[42] The proposed alternative will utilize a comprehensive plan similar to the University of Washington's DO-IT program in order to increase accessibility to STEM fields for people with disabilities. It is evident from my research as well as from peer-reviewed sources that negative interactions with professors hinder inclusivity in STEM classes and fieldwork and contributes to the underrepresentation of people with disabilities in STEM fields.[43] Thus, it is crucial that educators and researchers have access

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_1YR_S1810&prodType=table

[42]University of Washington. "DO-IT: Overview " washington.edu. retreived from: http://www.washington.edu/doit/about/overview (accessed November 29, 2016).

[43] Laura Marshak et al. "Exploring Barriers to College Student Use of Disability Services and Accommodations." *Journal of Postsecondary Education and Disability* 22.3 (2010): 158.

to resources on accommodating people with disabilities and fostering inclusive educational facilities.

In action, a program at UC Berkeley modeled after University of Washington's DO-IT program would provide comprehensive sensitivity training for faculty and increase their knowledge about and skills in educating students with disabilities and provide resources on implementing universally accessible classrooms that reduces physical and mental barriers to learning.[44] At UC Berkeley research managers, staff, and faculty would be required to participate in sensitivity training and have access to similar resources. Therefore, teachers and research supervisors would facilitate accessible and inclusive learning environments for disabled students.

This alternative would allow UC Berkeley administrators to develop and hold themselves accountable to an action plan for building universally accessible classrooms and field sites. Essentially, this alternative would provide an opportunity for UC Berkeley to commit to accessibility and address it as resources are available. More importantly, this option provides an opportunity for UC Berkeley to implement universal design, defined as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design."[45] Berkeley administrators, with input from UC Berkeley's Faculty Coalition for Disability Rights and students using the Disabled Students' Program, would establish a timeline and institute programmatic changes to pursue universal design over time without large and immediate financial investment. For example, UC Berkeley can start with

[44] Johnson, Donna M., and Judith A. Fox. "Creating curb cuts in the classroom: Adapting Universal Design principles to education." *Curriculum transformation and disability: Implementing Universal Design in higher education* (2003): 7-21. ; Burgstahler et al,156.

[45] University of Washington. "Universal Design: Process, Principles, and Applications " washington.edu. retrieved from: http://www.washington.edu/doit/universal-design-process-principles-and-applications (accessed November 29, 2016).

accessibility in classrooms by holding mandatory in-person or online trainings led by UC Berkeley's access specialists and compliance officers. Although a professor's time is often limited, ideally these trainings would only be an hour long and would need to be completed at the beginning of each year or before professors begin their first class of the semester. Resources regarding best practices of inclusive accommodation and accessible design in classrooms and field research should also be readily available to faculty and staff. Therefore, UC Berkeley can progressively build an accessible campus while balancing other campus expenses. This alternative is not an excuse for inaction, but rather it acknowledges the financial difficulties of implementing accessible design and works towards programmatic changes and gradual solutions.

V. Policy Goals and Selecting Criteria

Effectiveness: Minimizing Barriers to Research for People With Disabilities

The major policy goal is to encourage more accessibility in STEM field research, including agricultural research spaces. In order to measure progress and effectiveness of addressing accessibility, there needs to be a specific criterion that gauges effective accessibility of each alternative. The primary criterion to measure progress on accessibility in this case would be to consider whether each alternative can effectively minimize barriers to agricultural and field research spaces for disabilities, including physical, financial, and knowledge barriers present within the UC Berkeley campus.

Equity: Encouraging Participatory Involvement of People with Disabilities in Research Spaces

Equity is a primary criterion that should also be a primary concern of the UC Berkeley administration. Thus, each alternative will also be measured by whether or not it fosters equitable and participatory involvement of people in STEM fields. At UC Berkeley, people with

disabilities are often taken out of research fields and provided a separate assignment rather than being given the tools and resources they need to participate in the space with their peers. Each alternative will be evaluated on whether it has the potential to provide both short-term and long-term inclusive accommodations in science fields.

Efficiency: Minimizing Cost and Maximizing Benefit

Each policy alternative and its associated outcomes will also be evaluated on the basis of minimizing costs and maximizing benefit for the UC Berkeley. Chancellor Dirks announced in February that UC Berkeley is experiencing a $150-million debt.[46] Therefore, it is imperative to consider cost as a factor when looking to maximize equitable benefits. However, costs and benefits in this context is more than simply monetary, therefore, efficiency includes non-monetary costs that affect UC Berkeley and the surrounding community. Efficiency consists of the ratio between cost and benefit (both internal and external) of each policy option. Thus, both cost and benefit will be considered when measuring financial feasibility of each outcome. The efficiency of each outcome will ultimately help address the policy problem while maintaining the realistic financial constraints faced by the University of California, Berkeley.

Compliance: Meeting Civil and Legal Duties to Uphold Equity and Inclusion

Lastly, policy outcomes will be evaluated on the criterion of compliance. Compliance in this context refers to meeting legal obligations as well as meeting civil obligations established by UC Berkeley's land-grant mission. Specifically, compliance measures whether the policy outcomes uphold state and federal legal obligations to include and accommodate people with

[46] Teresa Watanabe. "As UC Berkeley tries to close its deficit, administrators feel the ire of traditional faculty allies," *LA Times* (April 2016). retrieved from: http://www.latimes.com/local/education/la-me-berkeley-deficit-20160421-story.html

disabilities. Particularly, each alternative should align with state and federal laws against disability discrimination and support readily achievable accommodations. Additionally, compliance examines how the policy outcomes maintains UC Berkeley's mission as public institution. Thus, compliance will also be used to measure if policy outcomes work towards UC Berkeley's campus mission to uphold equity and public service within scientific fields.

VI. Using Criteria to Project Outcomes

Evaluating the Outcomes of Letting Current Trends Continue

The alternative of letting current trends continue will not minimize barriers in research facilities because the recent trend at UC Berkeley is non-compliance[47] and inaccessibility. While UC Berkeley strives to maintain equity and inclusion on campus, it fails at meeting the needs of students and the local communities in recent years, as exhibited by the inaccessibility of agricultural research spaces, the failure to create accessible online content, and the cutting of UC Berkeley's WAIV program[48] that helps to ease the transition to college for students with disabilities. Despite promises of alternative solutions, no immediate solution has been implemented to address the failure of UC Berkeley in supporting people with disabilities. Thus, a natural projection to implementing modified research spaces is unlikely and the likelihood of UC Berkeley maintaining barriers of accessibility is high.

Letting current trends continue also fails to fulfill the criteria of efficiency because while short-term costs would be lower, the long-term cost of inaccessibility is high. Due to the

[47]Ashley Wong. "Campus Disabled Students' Program has been noncompliant with state regulations for years," *The Daily Californian* (October 2016) retrieved from: http://www.dailycal.org/2016/10/13/campus-disabled-students-program-noncompliant-state-regulations-years/

[48] Filipa A. Ioannou. "Disability program's closure troubles UC Berkeley students," *San Francisco Chronicle* (September 2016) retrieved from: http://www.sfchronicle.com/bayarea/article/Disability-program-s-closure-troubles-UC-9517890.php

increasing number of disabled students and their accommodations, the associated legal risks for ADA compliance also increase. Additionally, UC Berkeley's current structural deficit is framed as an issue of overspending rather than an issue caused by poor allocation and defective internal management. This framing allows UC Berkeley administrators to selectively choose what costs they wish to bear based on their specific priorities, regardless of whether those priorities align with the best interest of the entire student body. In 2014-15, UC Berkeley, Riverside, and Davis collectively received $100.6 million from the State of California for Agriculture Experiment Stations.[49] In that same year, agricultural services at these three schools received roughly $62.3 million collectively in federal funding for agricultural sciences, of which $21.5 million was provided to UC Berkeley.[50] Assuming that this funding was delegated to agricultural experiment stations and cooperative extensions services, research spaces and UC Agricultural and Natural Resources should have no trouble providing disability accommodations that meet federal and state disability compliance laws. The current management of these funds at UC Berkeley has been called into question by a California State Auditor report, which alleged that the UC system did not properly monitor how the $100.6 million in state funding for agriculture research stations was allocated and that transparency in budgeting at UC Berkeley is largely lacking.[51]

Although UC Berkeley prides itself on equity and inclusion, equity will not be retained if current trends of inaccessibility in research spaces persist. UC Berkeley's current model of disability services is based on the obsolete DSS (Disability Support Services) model, which "is based on…'fixing the students with disabilities', one at a time -- not fixing or making the

[49] California State Auditor Report 2015-107, Table 17 p. 75
[50] National Science Foundation. "Higher Education Research and Development Survey Fiscal Year 2015." Data Table 39 retrieved from: https://ncsesdata.nsf.gov/herd/2015/html/HERD2015_DST_39.html
[51] California State Auditor Report 2015-107, iv

academic program accessible in the first place."[52] The fix-the-program model rather than the fix-the student model needs to be applied to scientific education and field research. For example, a current accommodation for disabled students in field-based courses is taking students out of their field study, separating them from the classroom environment and providing an alternative assignment. While some students may need an accommodation for separate assignments, which should be acknowledged, it should not be automatically assumed that students are unable to participate and need to be isolated from their peers. Rather than trying to fix the student, more accessible and inclusive program restructuring needs to occur, otherwise UC Berkeley will have to take responsibility for the high expense of legal risks for non-compliance. Accommodations that foster inclusive participation should be explored before disabled students are separated from their classmates.

Currently, the emphasis of accommodation is placed on fixing the student instead of the environment, which is evident when looking at how students are segregated out of field studies before other more participatory options are explored.[53] The main concern for students is getting their degree instead of building their skills and resumes, so students with disabilities take isolating accommodations that offer less experiential learning opportunities, but still meet course or lab requirements.[54] However, this limits career opportunities in the long-term as fewer people with disabilities are able to access the educational and experiential learning opportunities they need to succeed in their respective fields of study. Without this full experience, it is more

[52] Paul Hippolitus (former Director of Disabled Students' Program), in a retirement message over email to Jenna Shelton, September 19, 2016.
[53] Ben Perez. Interviewed by Jenna Shelton. Personal Interview . Berkeley, October 24, 2016.
[54] Ibid.

difficult for a person with a disability to access higher paying careers in STEM fields.[55] Therefore, fostering accessible spaces in scientific research, especially in STEM areas with field research, is a moment of opportunity for UC Berkeley to support students with disabilities by creating participatory experiential learning opportunities, reinvigorate its image as a campus that upholds full participation and equity, and increase opportunities for career growth by providing more accessible spaces.

Given UC Berkeley's failure to address accessibility on campus, the chance that UC Berkeley will meet civil and legal compliance obligations in the future is low. As a land-grant institution, UC Berkeley has an obligation to "...offer an opportunity in every State for a liberal and larger education to larger numbers, not merely to those destined to sedentary professions, but to those much needing higher instruction for the world's business, for the industrial pursuits and professions of life." [56] Land grant institutions serve as hubs for mechanical and agricultural education for the community and for students who are willing to learn. Thus, UC Berkeley has a mission of providing an accessible and practical education to students and community members; a mission that is particularly upheld by agricultural research spaces.

Yet while roughly 10% of Alameda County consists of people with disabilities and about 20% of Americans are disabled,[57] UC Berkeley's agricultural research spaces are inaccessible to

[55] Burgstahler, Sheryl, Ronda J. Jenson, Alexis N. Petri, Arden D. Day, Kevin Z. Truman, Kate Duffy, Jay K. Martin et al. "From the STEM Special Issue Editor." *Journal of Postsecondary Education and Disability* 24, no. 4 (2011): 4-7

[56] Hon. Justin W. Morrill. *An address in behalf of the University of Vermont and State Agricultural College*. Free Press Assoc., Burlington, Vt., 1888.

[57] US Census Bureau, "Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports," US Census Bureau Public Information Office (2012). retrieved from: https://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html (accessed November 30, 2016)

a relatively large proportion of the local population. If we let current trends continue, UC Berkeley continues to distance itself from its land-grant mission and fails to represent the shifting demographic of involving people with disabilities in agriculture. By ignoring a sizable demographic of the population in agricultural studies through maintaining inaccessibility, UC Berkeley is failing to meet the needs of the local and national populations.

Evaluating the Outcomes of Using Land-Grant Funding to Support Disability Services in STEM Research and Education

Land-grant funding used to support disability services in research areas will work to moderately minimize barriers to research. With this alternative land-grant funding can be used for the purpose of providing disability accommodations within the agricultural research spaces, putting less financial burden on classes or individual agricultural research spaces to fund modifications. For example, the funds could be used for— but is not limited to— the use of purchasing modified tools and garden beds, creating accessible resources for people with hearing impairments, and putting braille on signage. However, this alternative is only moderately effective because it only works to bring down two out of three barriers to accessibility at UC Berkeley: physical barriers and financial barriers. Since the land-grant funding can only be used for specific purposes, the funding cannot be used for creating programmatic changes at a campus-wide level, which is needed to remove barriers to knowledge about disability so that faculty and managers will be more willing to institute more inclusive teaching and educational design.

Using land-grant funding for disability services is moderately efficient and equitable. A portion of land-grant funding would be reallocated to supporting the involvement of people with disabilities within agricultural research spaces, so UC Berkeley would not be accumulating debt

by implementing this alternative. Additionally, the agricultural research spaces would be receiving more financial help that will allow them to meet the needs of the community and provide a broader impact, increasing external benefits. Additionally, allocating funding will help to foster inclusivity by providing modifications that will aim to integrate disabled in non-disabled people in a garden or farm setting.

Moreover, using land-grant funding will also moderately help to champion UC Berkeley's civil and legal duty to maintain access on campus. As a land-grant institution, one of UC Berkeley's goals is to serve the needs of the community. Since many of the farms serve patrons with disabilities, using land-grant funding to support disability accommodation and universal design in agricultural research spaces lives up to the land-grant mission by supporting community involvement and providing resources in both the long-term and short-term This solution would also meet legal obligations because it would help agricultural research spaces provide reasonable accommodations to students and community members. Since the identity of farmers and food workers is expanding across the globe to include more women, more LGBTQI people, and people with disabilities, as exhibited by farmers in wheelchairs from Australia, the farming communities at Berkeley and at other UC campuses can reflect and embrace this diversity through providing inclusive accommodations with land-grant funding. In doing so, UC Berkeley would respond to the changing demographic of the farming community and promoting access, which also serves to fulfill their land-grant mission and uphold state and federal obligations.

Evaluating the Outcomes of Adopting a Version of University of Washington's DO-IT Program

Adopting a program similar to University of Washington's DO-IT program that is tailored to the needs and mission of UC Berkeley would be the most effective alternative because

it would work to remove all barriers, physical, financial, and knowledge-based, through programmatic changes at the institutional level within a reasonable timeframe. Since the DO-IT program adopts a universal design approach to academia, physical barriers in classrooms and research spaces are likely to be removed over time and inclusive accommodations will be implemented whenever possible to ensure that people with disabilities have access to research spaces and classrooms. Specifically, the DO-IT program has an *AccessSTEM* project that implements changes within colleges to make STEM programs more welcoming and accessible to people with disabilities by "expanding engagement of stakeholders (precollege STEM educators, disability services, veteran associations, projects that broaden participation in STEM, and industry and career services) in fostering STEM education and careers that are welcoming and accessible to people with disabilities."[58] The DO-IT program applies change at an institutional level to meet the needs of disabled students in STEM fields across campus and addresses knowledge barriers by providing resources to professors, including training programs, workshops and presentations on how to engage students with disabilities in the classroom and in fieldwork. At UC Berkeley, workshops on accommodations and other training programs can be tailored specifically to operations staff of agricultural research spaces, providing information and training on how to foster accessibility and meet accommodations within the research spaces themselves. The DO-IT program also links disabled students in STEM fields to careers after graduation, supporting disabled students on and off campus.

[58] University of Washington."AccessSTEM" washington.edu. retrieved from: http://www.washington.edu/doit/programs/accessstem/overview/about-accessstem-project (accessed November 29, 2016).

The same program should be applied and tailored to UC Berkeley in order to remove barriers to STEM fields and support disabled students. Although the University of Washington is not a land-grant institution, the DO-IT program can be modified to fit the needs to UC Berkeley as a land-grant college. Particularly, the universal design component of the DO-IT program can be merged with sustainable and diversified farming techniques to increase physical accessibility within agricultural research spaces and other scientific fields. The application of the DO-IT Program at UC Berkeley will remove barriers in classes and research spaces and provide comprehensive assistance to professors and students in STEM education.

Equity would also be increased if UC Berkeley adopted the University of Washington's DO-IT program because it would use universal design to create inclusive participatory research spaces. The DO-IT program uses awareness and accessibility to make research areas and classrooms on college campuses more inclusive. It specifically encourages the full involvement of people with disabilities in STEM fields through "...cooperative efforts between the student, instructor, and support staff [to] ensure that fieldwork experiences are successful."[59] According to the DO-IT Program, some field work accommodations may include, but are not limited to, fieldwork sites in accessible locations, accessible transportation to and from the fieldwork location, detailed orientation to the fieldwork site, especially for students with visual impairments, and group fieldwork activities.[60] By making fieldwork a collaborative process that acknowledges the varying needs of people with disabilities, the DO-IT program allows people with disabilities to advocate for their needs while providing options that encourage inclusive

[59] University of Washington."AccessSTEM: Fieldwork" washington.edu. retrieved from: http://www.washington.edu/doit/fieldwork (accessed November 29, 2016).
[60] Ibid.

participation in research settings. Therefore, implementing a DO-IT program at UC Berkeley would mainstream the inclusive involvement of people with disabilities in STEM fieldwork.

This alternative is the most efficient because balances costs and benefits through gradual programmatic changes while still providing solutions in the short-term. The implementation of the DO-IT program at the University of Washington is primarily funded by Washington State, National Science Foundation, and the U.S. Department of Education, however, other funding has been acquired through a variety of grants and donations.[61] It is possible that UC Berkeley could receive financial assistance through state and federal grants in order to implement this program, as it will serve to benefit students and community members by promoting accessibility in research fields. Additionally, UC Berkeley could also pursue funding from foundations and STEM-focused non-governmental organizations, which also has the potential to help UC Berkeley build partnerships and boost career options for graduates in STEM fields. There are various funding sources that can be used to implement a DO-IT program at UC Berkeley, but the responsibility falls on UC Berkeley to allocate funding for inclusion and accessibility on campus to begin with. Moreover, the universal design aspect of the DO-IT program is cost effective because universal design "...considers all resources (including valuable human ones) and attempts to minimize long-term costs"[62] Since universal design components will help to decrease liability costs in the future, the cost of the program in the long term is more cost effective. Thus, universal design attempts to avoid long-term costs of liability and considers benefits of added value.

[61] University of Washington. "DO-IT Funding and Partners" washington.edu.retrieved from http://www.washington.edu/doit/about/funding-and-support/do-it-funding-and-partners (accessed November 29, 2016).
[62] Robert Null. *Universal Design: Principles and Models* (Florida: CRC Press, 2013), 52.

Implementing a DO-IT program at UC Berkeley will allow UC Berkeley to comply with civil and legal obligations to uphold accessibility standards. UC Berkeley is bound by both federal and state legislation to support disability accommodation. As mentioned previously the California Government Code requires the full and equal access of programs for institutions receiving federal and state funding. Yet, with inaccessible research spaces in STEM fields, UC Berkeley is non-compliant with state law. However, this issue can be addressed through the implementation of the DO-IT program at UC Berkeley because it utilizes universal design techniques and provides resources to professors about disability in education, which ultimately serves to foster full participation within campus spaces. UC Berkeley should support a movement towards universal design because "...with universal program adjustments in place, [UC Berkeley] will be naturally more accessible; and, in turn, better able to more cost-effectively (including reducing legal risks) meet the volume of business heading [their] way. Plus, some of these universal strategies will benefit both nontraditional students as well as all other students."[63] With the rise of disabled student numbers at UC Berkeley, UC Berkeley needs to prioritize accessibility in a way that meets state and federal law, reducing legal risks and supporting students. The DO-IT program also allows disabled people to be seen as viable research assistants, ultimately promoting equity and inclusion in STEM fields throughout campus

VII. Confront Tradeoffs Between Outcomes

The University of California is still considered one of the most liberal institutions in higher education and one of the most accessible for people with disabilities. However, if current trends continue, non-compliance and inaccessibility within research spaces will be maintained,

[63] Paul Hippolitus (former Director of Disabled Students' Program), in a retirement message over email to Jenna Shelton, September 19, 2016.

financial deficits will increase as a result of liability, and equity will be reduced. UC Berkeley has recently experienced a string of scandals and student and faculty backlash regarding the non-compliance of programs and resources on campus, further emphasizing the lack of resources for disabled students and the need for campus administration to support them. According to Georgina Kleege, a Disability Studies professor at UC Berkeley:

"It's possible to see an undertone of resentment. "'Oh, these people with disabilities are asking for too much. It's too expensive and we can't possibly accommodate all these people.' It makes a subtle statement about inclusion of people with disabilities on this campus."[64]

The inaccessibility of campus research spaces will be maintained at UC Berkeley if research for people with disabilities is not addressed. UC Berkeley needs to pursue the creation of accessible research and classroom spaces by implementing inclusive accommodation and institutional change. If current trends remain constant, however, equity and retention of people with disabilities in STEM fields at UC Berkeley will be reduced because people with disabilities will face barriers to agricultural research spaces and will not be fully empowered to participate in field spaces and research.

In contrast, utilizing land-grant funding to fund accommodation will allow UC Berkeley to make more individual accommodations in each garden. While this solution will not entirely uphold compliance standards, it is moderately effective, equitable, and efficient. It should also be noted, however, that in order to reallocate land-grant funding for the purpose of providing disability modifications in agricultural research spaces, funding needs to be subtracted from other programs that are working towards the land-grant mission as well. While using the money

[64]The Daily Californian. "Campus Disabled Students' Program has been noncompliant with state regulation for years." dailycal.org. Retrieved from: http://www.dailycal.org/2016/10/13/campus-disabled-students-program-noncompliant-state-regulations-years/ (accessed October 14, 2016).

for accessibility in the research spaces would address the issue, it does not fit the scope of the problem. While financial support is helpful, this solution disregards the importance of building institutional knowledge of disability accommodation and places the entire responsibility of providing accommodation in fieldwork on operations managers in research fields. Thus, institutional support for disability accommodation and universal design should be available as a resource to ensure that research managers and faculty have the information available to make accommodations. Inaccessibility at UC Berkeley is a campus-wide problem and a campus-wide solution needs to be applied. Therefore, using land-grant funding for addressing accessibility will not entirely address the problem because it can only be applied to specific fields of study and does not address the issue at an institutional level.

Implementing a DO-IT program at UC Berkeley would help to make UC Berkeley compliant with federal and state law, support equity on campus, increase accessibility, and maintain efficiency. This alternative results in an outcome that would address the campus-wide scope of inaccessibility through programmatic changes that remove barriers to education. Although it could be argued that the cost of this alternative is too high, the outcomes result in measures that decrease cost over time. Additionally, in times of deficit the campus has still been able to fund discretionary expenditures, for example the campus acquired funding for a $700,000 gate for the Chancellor's estate that was 2.5 times over the original budget.[65] While the value of these funds can be debated, compliance with state and federal law cannot and should therefore be prioritized above discretionary expenditures.

[65] Matier & Ross "UC Berkeley's $700,000 fence keeps protesters at bay," *SF Chronicle,* May 14, 2016, accessed December 10, 2016.
http://www.sfchronicle.com/bayarea/article/UC-Berkeley-s-700-000-fence-keeps-protesters-7468181.php

The concern of inaccessibility at UC Berkeley is not driven by the issue of undue hardship or lack of financial capital, but rather is an issue of the unwillingness for faculty and administration to prioritize accommodating students due to lack of knowledge about disability. There is a misconception that accommodating students and people with disabilities is financially and administratively infeasible. However, making accommodations in field work and moving towards universal accessibility in agricultural spaces can be as easy as putting braille on entry signs, laying out traction mats for wheelchair users after significant rainfall, having modified tools available, or simply having the institutional knowledge of how to work with people with disabilities both in classrooms and in field work. At the same time, faculty and researcher managers should not be responsible for improvising accommodations on their own, therefore campus-wide support for disability services is needed. While it may not be efficient in terms of financing for UC Berkeley to physically redesign fully accessible spaces in the short-term, UC Berkeley can make programmatic accommodations and changes over time to make scientific research more accessible. Nevertheless, full accessibility is something that the University of California Berkeley should work towards

VIII. Final Recommendation

As it stands now, UC Berkeley is excluding people with disabilities in scientific fields across campus, contradicting its mission of equity and inclusion, violating state and federal law, and decreasing valuable inputs that could expand scientific knowledge. Despite support from UC Berkeley's Disabled Students Program, disabled students experience considerable barriers to research spaces and the program itself is struggling to accommodate the influx of disabled

students with high staff turnover rates.[66] Inaccessibility within STEM fields at UC Berkeley is a campus-wide issue, but it can be particularly seen within campus agricultural spaces. According to conducted site surveys, no agricultural research space owned by UC Berkeley is fully accessible to people with disabilities.

In order to address the issue of accessibility on campus, I suggest that UC Berkeley implement a program that is similar to the University of Washington's DO-IT program and tailor it to the needs of UC Berkeley as a premier public research institution. The alternative of implementing a DO-IT program tailored to UC Berkeley would most effectively address the scope of inaccessibility, especially in STEM fields, and would remove systemic barriers, resulting in an increase of socially robust knowledge in fields with low diversity. The DO-IT program's push towards universal design would also ensure that UC Berkeley is meeting legal compliance obligations while valuing participation and diverse perspectives of people with disabilities in STEM fields.

Implementation of the DO-IT program would also increase staff knowledge about disability, allowing for more willingness of managers and faculty in science to accommodate people with disabilities and work towards expanding demographics within scientific fields. Not only would implementing accessibility standards in science work to dismantle inequities on campus, it would also develop a robust epistemology of science through new perspectives. Ultimately, a DO-IT program is the best option at UC Berkeley because it works towards a more inclusive and accessible campus spaces for faculty, students, staff, and community members, and allows for different perspectives in scientific fields.

[66] Paul Hippolitus (former Director of Disabled Students' Program), in a retirement message over email to Jenna Shelton, September 19, 2016.

It should also be noted, however, that UC Berkeley also needs to conduct an internal impact analysis on inaccessibility. Currently, no such procedure has been conducted internally. Moreover, a lack of both transparency and accountability has hampered quantitative attempts to analyze impact of a DO-IT program at UC Berkeley. Quantitative data on the allocation of research funding and the distribution of disabled students across fields at UC Berkeley is not readily available, in which case it begs the question of whether information, especially data related to the Disabled Students' Program, is being monitored at all.

Only UC Berkeley has the ability to provide clarification and make the programmatic changes necessary to become a more accessible institution. As a top public university with a deep history of disability rights, UC Berkeley has a unique opportunity to set a new accessibility standard for many other universities. By promoting accessibility through institutional change, UC Berkeley will not only increase socially robust knowledge in stem fields affirm the value of disability as a fundamental part of society. In order to be a pioneer in diversity and inclusion, it is essential that UC Berkeley recognize the potential contribution of people with disabilities to scientific fields.

Appendix

Figure 1: Limited Pathway Width at the UC Gill Tract

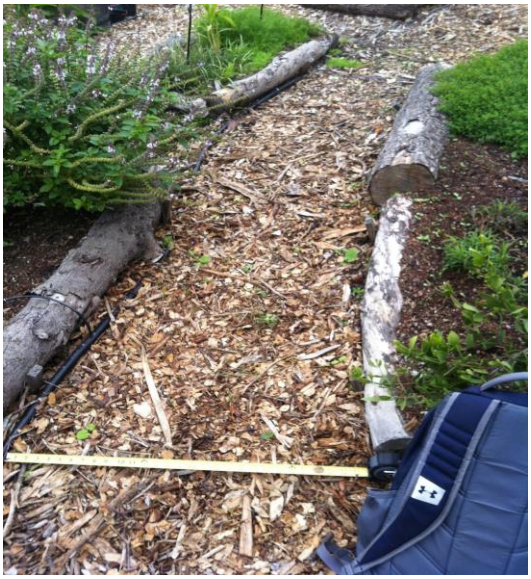

Fig 1. (left): The log in the upper right corner reduces the width of the row from 27 inches to about 23 inches (UC Gill Tract)

Figures 2 and 3: Barriers in the Path Decrease Accessibility

Fig. 2 and 3: On the left, the tape measure shows an accessible width of 44.25 inches with a pole in the background in the pathway that holds up netting. On the right it is shown that the pole placement reduced the pathway to roughly 33 inches wide; three inches away from ADA accessibility standards. (UC Gill Tract)

Figures 4 and 5: Accessible Alternatives to Ground Planting Within the Agricultural Spaces

Figure 3 and 4: Wine Barrels converted into transplant pots (UC Gill Tract) and vertical garden beds (Student Organic Garden) help make the planting more accessible to people with limited mobility

Table 1: Standard Dimensions for Raised Beds

		Mobility		
		Wheelchair	Semi-Ambulatory	Ground
Measurement	Height	2-2.5 feet	2.5-3 feet	1/2-1 feet
	Width (one-sided)	2 feet	2 feet	2 feet
	Width (two-sided)	3-4 feet	4 feet	4 feet
	Diameter (circle)	3-4 feet	4 feet	4 feet

Note. Reprinted from *Consumer Horticulture by* Diane Relf, Extension Specialist. *Department of Horticulture, Virginia Polytechnic Institute & State University. Retrieved from: http://www.hort.vt.edu/HUMAN/pub426020d.html*

Table 2: Height of Raised Beds in Agricultural Research Spaces owned by UC Berkeley

Average Height of Raised Bed (in inches rounded to the nearest tenth)		
Spaces		
	Oxford Tract	N/A*
	Student Organic Garden	12.7
	UC Gill Tract Community Farm	22.0

Note. N/A refers to not applicable because there are no raised beds

Table 3: Possible Modifications in Agricultural Research Spaces

Practices for Accessibility in Garden Spaces
Clear and durable pathways
Wide pathways (36 inch ADA width requirement)
Vertical beds
Raised beds
Insert raised beds throughout the garden so that people with different abilities can work together
Traction mats
Entry Signs with braille
Gardening Guides in braille
Signs with large bold print
Signs that allow service animals (and protocol for service animals in the garden space)
Gardening guides with instructions and diagrams
Interactive gardening demonstrations (equipped with a guide with instructions and diagrams)
Post an outline of the day's events in a visible area
Garden beds with brightly marked corners
Tactile guide markers before each bed
Plants that have different textures and colors that appeal to various senses/"sensory gardens"

Note. The modifications above are some of the many ways to encourage accessibility. Volunteers with disabilities may also have individual accommodations that are not explicitly stated above.

Table 4: Variance of Disability

Variance of Disability			
Type of Impairment	**Definition**	**Broad Classifications**	**Specific Examples**
Physical	Any physiological disorder or condition, cosmetic disfigurement, or anatomical loss affecting one or more of the following body systems: neurological, musculoskeletal, special sense organs, respiratory (including speech organs), cardiovascular, reproductive, digestive, genito-urinary, hemic and lymphatic, skin and endocrine. Can vary in severity: low, moderate, high. (Williams College)	Mobility Impairment, Chronic Pain, Limited use of arms and/or legs, Respiratory Impairments, Cardiovascular Impairments	Cerebral Palsy, Cystic Fibrosis, Inflammation of Nerves, Amputation, Arthritis
Sensory	Any condition in which one of the senses; sight, hearing, smell, touch, taste and spatial awareness, is limited. Can vary in severity: low, moderate, high. (Achieve Australia)	Hearing Impairments, Visual Impairments, Spatial Impairments, Numbness	Glaucoma, Eye Injury, Macular Degeneration, Cataract
Cognitive	Any condition in which someone has permanent difficulties with remembering, learning new things, concentrating, or making decisions. Can vary in severity: low, moderate, high. (UCSF Memory and Aging Center)	Memory Impairments, Language Impairments, Reasoning Impairments, Impairment of Fine Motor Skills, Behavioral Impairments	Dementia, Parkinson's Disease, Stroke, ADHD, Bipolar Disorder

Note. The table above depicts variance in disability, but due to the comprehensive nature of disability, it does not provide all examples of how disability can impact an individual.

Bibliography

2010 ADA Standards for Accessible Design § 403.5.1 et seq.

"About Equity and Inclusion." *UC Berkeley Division of Equity and Inclusion*. Last Modified 2016. http://diversity.berkeley.edu/about

"AccessSTEM," *University of Washington.* Accessed November 29, 2016, http://www.washington.edu/doit/programs/accessstem/overview/about-accessstem-project

"ADA Accessibility Guidelines." *United States Access Board.* Accessed October 28, 2016 https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/adaag#purpose

"A Guide for Making Community Gardens Accessible for all Members" *Grassroots Gardens of Buffalo,* accessed September 2, 2016, http://www.grassrootsgardens.org/uploads/2/6/3/8/26383225/a_guide_for_making_community_gardens_accessible_for_all_members.pdf

"American FactFinder fact sheet: Alameda County, CA," *U.S. Census Bureau.* Of 2015). Accessed November 25, 2016. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_1YR_S1810&prodType=table

Americans With Disabilities Act, 42 U.S. Code (1990) § 12101 et seq.

Burgstahler, Sheryl, Ronda J. Jenson, Alexis N. Petri, Arden D. Day, Kevin Z. Truman, Kate Duffy, Jay K. Martin et al. "From the STEM Special Issue Editor." *Journal of Postsecondary Education and Disability* 24, no. 4 (2011): 4-7

California State Auditor Report 2015-107

California Civil Code § 51 et seq.

California Government Code § 11137 et seq.

California State Auditor Report 2015-107

Davis, Haley (Student Organic Garden Programs Manager) Interviewed by Jenna Shelton. Berkeley, October 2, 2016.

Doe, Jane (UC Berkeley Student) Interviewed by Jenna Shelton. Personal Interview. Berkeley, November 11, 2016.

"DO-IT Funding and Partners" *University of Washington.* Accessed November 29, 2016, http://www.washington.edu/doit/about/funding-and-support/do-it-funding-and-partners

"DO-IT: Overview " *University of Washington*. Accessed November 29, 2016, http://www.washington.edu/doit/about/overview

"Higher Education Research and Development Survey Fiscal Year 2015" *National Science Foundation.* https://ncsesdata.nsf.gov/herd/2015/html/HERD2015_DST_39.html

Hippolitus, Paul (former Director of Disabled Students' Program). Personal Correspondence. September 19, 2016.

Hoffman, Jon (UC Gill Tract Manager) Interviewed by Jenna Shelton. Berkeley, November 6, 2016.

Ioannou, Filipa A. "Disability program's closure troubles UC Berkeley students," *San Francisco Chronicle* (September 2016). http://www.sfchronicle.com/bayarea/article/Disability-program-s-closure-troubles-UC-9517890.php

Johnson, Donna M., and Judith A. Fox. "Creating curb cuts in the classroom: Adapting Universal Design principles to education." *Curriculum transformation and disability: Implementing Universal Design in higher education* (2003): 7-21. ; Burgstahler et al,156.

Marshak, Laura, et al. "Exploring Barriers to College Student Use of Disability Services and Accommodations." *Journal of Postsecondary Education and Disability* 22.3 (2010): 158.

Matier & Ross "UC Berkeley's $700,000 fence keeps protesters at bay," *SF Chronicle*, May 14, 2016. Accessed December 10, 2016. http://www.sfchronicle.com/bayarea/article/UC-Berkeley-s-700-000-fence-keeps-protesters-7468181.php

McKnight, Katie (Former UC Gill Tract Fellow) Interview by Jenna Shelton. Berkeley, October 13, 2016.

Meralina (UC Berkeley Students and Researcher) Interviewed by Jenna Shelton. Berkeley, September 28, 2016

Morrill, Justin W. Hon. *An address in behalf of the University of Vermont and State Agricultural College.* Free Press Assoc., Burlington, Vt., 1888.

Perez, Ben (Campus Access Specialist at UC Berkeley) Interviewed by Jenna Shelton. Berkeley, October 24, 2016.

Public Affairs, UC Berkeley."A statement of online course content and accessibility" *UC Berkeley*. accessed November 25, 2016, http://news.berkeley.edu/2016/09/13/a-statement-on-online-course-content-and-accessibility/

Wantanabe, Teresa. "As UC Berkeley tries to close its deficit, administrators feel the ire of traditional faculty allies," *LA Times* (April 2016). http://www.latimes.com/local/education/la-me-berkeley-deficit-20160421-story.html

Wong, Ashley "Campus Disabled Students' Program has been noncompliant with state regulations for years," *The Daily Californian* (October 2016). http://www.dailycal.org/2016/10/13/campus-disabled-students-program-noncompliant-state-regulations-years/

"Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports," *US Census Bureau Public Information Office* (2012). accessed November 30, 2016, https://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html

Null, Robert. *Universal Design: Principles and Models* (Florida: CRC Press, 2013), 52.

Relf, Diane. Extension Specialist, Consumer Horticulture. Department of Horticulture, Virginia Polytechnic Institute & State University, http://www.hort.vt.edu/HUMAN/pub426020d.html

Rehabilitation Act, 29 U.S. Code (1973) § 701 et seq.

Shapiro, P. Joseph *No Pity: People with Disabilities Forging a New Civil Rights Movement*. Crown/Archetype, 2011. Kindle Edition.

"The Land-grant Tradition." *Association of Public and Land-grant Universities.* Washington, DC: APLU, 2012 retrieved from: http://www.aplu.org/library/the-land-grant-tradition/file

"The United States' Findings and Conclusions Based on its Investigation Under Title II of the Americans with Disabilities Act of the University of California at Berkeley, DJ No. 204-11-309" *U.S. Department of Justice*. accessed October 21, 2016, https://news.berkeley.edu/wp-content/uploads/2016/09/2016-08-30-UC-Berkeley-LOF.pdf

"What is the Americans with Disabilities Act?" *The National Network.* accessed October 20, 2016, https://adata.org/learn-about-ada.

Wistrom, Tina. (Oxford Tract Manager) Interview by Jenna Shelton. Berkeley, October 21, 2016.