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An Exploration of the Relationship Between Disability Status Disclosure, Accommodation Use, and Student Success: Curricular and Co-Curricular Implications

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An Exploration of the Relationship Between Disability Status Disclosure,

Accommodation Use, and Student Success: Curricular and Co-Curricular Implications

by

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Abstract

Colleges and universities rely on the individualized accommodation process to ensure access for students with disabilities, however, there is ample evidence that educational inequity is pervasive. This study used a critical and comparative quantitative methodology (n=6,500) to investigate data from a large urban community college, analyzing the relationship between final grades and accommodation eligibility and use across academic disciplines and curricular modalities (in-person vs. on-line) to identify implications for the academic success of students with disabilities. Results indicate disability inequity varies across racial identity groups and racial inequity persists across disability status groups. Results also indicate that accommodation may be most impactful for students with lower cumulative grade point averages, students taking courses at the 100 level, students taking online courses, and students taking courses in disciplines such as math. There appear to be benefits to a connection with Disability Services even when students do not notify faculty of their eligibility for accommodation. Recommendations include the inclusion of disability as a demographic within institutional reporting; professional development for faculty, staff, and student leaders that goes beyond compliance to address implications of the intersections of gender, race, identity, and disability; and inclusion of disabled student voices to improve access and inclusion throughout curricular and co-curricular programs and activities.

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Chapter One: Introduction

Americans with disabilities represent a significant and growing demographic yet continue to be twice as likely to live in poverty, and half as likely to be employed as their non-disabled peers (Brault, 2012, Erickson et al., 2014). For some individuals, disability is present from birth, while for others, disability is acquired, sometimes through a dramatic life changing experience, sometimes through exposure to environmental hazards or a lack of access to health care. In any case, the experience of being disabled in American society is tied to self-concept (Bogart, 2014) and is not experienced in the same way by all individuals. The intersection of disability status with race/ethnicity, gender, socio-economic status, and cultural norms, means that the impact of being disabled is not consistent (Warner & Brown, 2011). However, we know that in the big picture, when all these individual experiences are aggregated and analyzed, there are consistent patterns in which disability status is tied to reduced rates of employment, and completion of post-secondary education moderates this pattern (McCauley, 2020). Put simply, promoting the full participation and equitable success of college students with disabilities is critical to ensuring individuals with disabilities are able to achieve the same rates of economic and social mobility as their non-disabled peers, and when colleges and universities fail to deliver on equitable student success, it is a problem for not just the impacted individuals, but for our society.

Colleges and Universities in the United States that receive federal funding are responsible for ensuring individuals with documented disabilities who are otherwise qualified are provided with reasonable accommodation, so they are able to participate in programs, complete courses, and benefit from services in a manner equivalent to their

non-disabled peers (ADA, 2008; Section 504, 1973). This responsibility is typically

delegated to offices tasked with management and facilitation of individual student

accommodation requests, confirmation of eligibility, and notification to instructional

faculty (Gordon & Keiser, 1998; Jarrow, 1997; Lewis & Farris, 1999; McEllilstrem et al.,

2001; Raue & Lewis, 2011; Toma & Palm; 1999; Wolanin & Steele, 2004).

Individual Accommodation for Students with Documented Disabilities

The accommodations that colleges and universities provide on an individualized

basis typically include things like extended testing time, notetaking supports, alternate

formats, assistive technology, and other access services (Raue & Lewis, 2011).

Interventions can also include approaches such as academic coaching (Bellman et al.,

2015), technology training (Burgstahler, 2003), and mentoring (Brown et al., 2010).

Unfortunately, even though students who receive comprehensive support services may

have higher GPAs, retention and graduation rates (Hodge, 2017) and students who

disclose disability status in the first year may be more likely to complete their program of

study in a shorter time frame (Hudson, 2013), research has confirmed college students

may be reluctant to formally disclose disability status for a variety of reasons, including

attitudinal barriers, inconsistent or overly bureaucratic procedures, stigma, and other

factors, (Barnard-Brak et al., 2010; Lyman et al., 2016; Marshak et al., 2010).

Even when students do successfully navigate the system to formally disclose

disability status, establish eligibility for accommodation, and notify instructional faculty,

they may do so selectively (Cox et al, 2017) and they may encounter instructors who

believe that accommodation creates extra work or lowers standards (Bourke et al., 2000;

Jensen et al., 2004; Scott, 1997) or instructors who question the legitimacy of their requests, leading to a difficult classroom climate (Kurth & Mellard, 2006).

Improving educational outcomes for college students with documented disabilities has been approached through a variety of frameworks and activities, some of which have aimed at reducing the reliance on accommodation by promoting more inclusive learning environments, materials, and activities. Universal Design is one of the more frequently discussed frameworks. It encourages designers to anticipate diverse needs and build flexibility and multiplicity into the design so different users can get what they need without individualized accommodation.

Universal Design to Increase Accessibility

Mace first defined Universal Design 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" (CUD, 1997, para 6). After founding the Center for Universal Design at North Carolina State University under a grant from the National Institute on Disability and Rehabilitation Research, he worked with a team of architects, engineers, and researchers, to outline seven principles that have been used extensively as a knowledge base for designers working with physical spaces, products, as well as learning environments (CUD, 1997). The concept branched out from architecture, and within higher education there have been several rounds of Universal Design demonstration projects aimed at improving educational outcomes for students with disabilities.

There have been a variety of interpretations which have used related, but different terms. For example, the Center for Applied Special Technology has taken a neuroscience approach to advocate for Universal Design for Learning (CAST, 2014), and made

significant progress infusing UDL in both K-12 and in higher education, especially

through the TACCT grants, and Open Ed movements, while the Center on Postsecondary

Education and Disability at the University of Connecticut took the original seven

Universal Design principles and added two more that were specific to education to create

9 Principles of Universal Design for Instruction (Scott et al., 2002).

An alternative application of Universal Design comes from the Center for

Research on Developmental Education and Urban Literacy at the University of

Minnesota where they took the nine principles and created a publication focused on

curricular transformation (Higbee & Goff, 2008). Some of the best-known work, has

come from the University of Washington, where the DO-IT Center has produced a wealth

of Universal Design training materials and related resources (Burgstahler, 2014).

Universal Design is not an American specific concept though. It is a framework

used in many parts of the world, for example, it has been adopted by the United Nations

within their approach to ensuring web accessibility (United Nations, 2015) and is

prominent within the Manila Design Recommendations on Accessible Information and

Communications Technologies (UN Enable, 2003). Universal Design does not remove

the need for individual accommodation but can serve a way to increase accessibility.

Whether using the triple pronged approach described through CAST as UDL, which calls

for multiple means of representation, multiple means of engagement, and multiple means

of expression (CAST, 2014), or using the 9 principles depicted as UDI (Scott et al.,

2002), in the end, what we are talking about is designing in ways that afford individuals

with different needs a choice in how to engage within an offering, allowing greater access

with less need for accommodation.

Limits on the Effectiveness of Accommodation

Approaches like Universal Design are important, because even though legal protections establish the right for students with disabilities to request and receive reasonable accommodation, according to the National Longitudinal Transition Study, only 37% of the students who received special ed in high school went on to disclose disability status at the post-secondary level, and only 24% actually used accommodation (Newman et al., 2009). Digging in more deeply, and taking demographics and diagnostic labels into account, African American students are 45% more likely to be identified as having emotional and behavioral disorders (Snyder & Dillow, 2013) and 53% of students with those types of diagnoses drop out of high school (Trainor, 2008). Thus, it may not come as a surprise that White college students are often overrepresented in the population of students with formally disclosed disabilities (Reid & Knight, 2006).

The need to take a more intersectional and holistic approach, rather than focusing solely on individual rights, has been articulated within the disability justice movement. Disability Justice is a term first coined in 2005 through the collective work of disabled queer women of color (Berne, 2015) and it builds on the disability rights movement, examining ableism as it relates to other forms of oppression and affirming the need to address inequities at the collective vs. individual level.

The word ableism may often be used in simple terms, for example Merriam-Webster has defined it as "discrimination or prejudice against individuals with disabilities," however a definition that is more suitable to critical research can be found in the work of activist and scholar TL, who has defined it as:

A system of assigning value to peoples' bodies and minds based on societally

constructed ideas of normalcy, productivity, desirability, intelligence, excellence,

and fitness. These constructed ideas are deeply rooted in eugenics, anti-Blackness,

misogyny, colonialism, imperialism, and capitalism. This systemic oppression

leads to people and society determining people's value based on their culture, age,

language, appearance, religion birth or living place, 'health/wellness' and/or their

ability to satisfactorily [re]produce, 'excel', and 'behave.' You do not have to be

disabled to experience ableism (Lewis, 2022 para 4).

This definition is robust, and while it has continued to evolve, from the inception,

it has recognized the ways in which ableism and racism are inextricably linked. If

colleges and universities want to ensure students with disabilities have equitable access to

postsecondary education, they will need to not only question historical practices that rely

almost exclusively on the individual accommodation process, and engage in work to

normalize disability as an aspect of diversity, but also recognize the ways in which White

privilege can actually be reproduced through disability accommodation, and reject the

idea that "classrooms are neutral environments for learning…by taking seriously how the

dynamics of power and privilege shape the lives of disabled and nondisabled people"

(Taylor et al., 2020 para 10). Additionally, they will need to ensure outcomes are

assessed authentically and regularly to ensure opportunity gaps can be identified.

The Problem

Colleges and Universities do not generally evaluate outcomes and experiences of

disabled students, rather they report on students who are using accommodation. The

distinction is critical. Because disability is not typically a demographic characteristic that

students are asked to disclose outside of the formal accommodation process, the actual

number and representation of disabled students remains hidden. Institutional data tends to

address disability in a manner that is peripheral, or supplemental to the main objectives

(Avellone & Scott, 2017) and there is a relative lack of research when it comes to the

climate-related experiences of students with disabilities (Kimball et al., 2016).

Some studies have indicated that students with disabilities are retained and

complete at lower rates than their peers (Horn & Berktold, 1999), while other studies

have confirmed similar rates for persistence and completion (Jorgensen et al., 2005;

Wessel et al., 2009). Institutions typically lack an understanding of the way in which

disability status is intersecting with other characteristics such as race/ethnicity, gender, or

age, and fail to track how disability may be showing up in different ways across programs

of study or modalities for engagement (Kimball et al., 2016; Shallish, 2015). This makes

it difficult to track progress and make improvements in alignment with institutional

commitments to promote the full participation of students with disabilities and achieve

some degree of equitable student success. Additional research is needed to inform

practice and in particular, research is needed that questions the historical model by using

data at large scale to study institutions and people in context, analyzing outcomes and

highlighting practices that could better serve historically marginalized populations.

The following chapter provides an extensive review of relevant literature.

Beginning with the critical quantitative research approach itself, the connection to critical

disability theory grounded the literature review. From here, the review delved into the

disability experience, focusing on how within our individual rights-based society, there

are visions of a more justice-oriented culture. An examination of current and historical

research on disabled students in postsecondary education followed, looking at persistence and degree completion, social and academic integration, and barriers to accommodation effectiveness. Following the literature review, the specific methodology used in this research is described in detail. The fourth chapter details the analysis itself while the final chapter addresses implications for future research and practice.

Chapter Two: Literature Review

There is a mantra that is often referenced in higher education that "accommodation levels the playing field." Colleges and universities put faith in the student accommodation process and expect the individualized interactive process of determining eligibility for auxiliary aids and services to be effective in mitigating barriers that might otherwise impede the full participation of individuals who experience disability.

However, there is ample evidence that inequity is pervasive – that access to education in theory does not always translate to access in ways that are equitable, and disparities in education, coupled with a society in which ableism is common, means that people with disabilities experience barriers, even when accommodation is available, and "pervasiveness of…ableist assumptions in the education of children with disabilities not only reinforces prevailing prejudices against disability but may very well contribute to low levels of educational attainment and employment" (Hehir, 2002 p. 4). Our society needs well-educated people. As noted in reports such as "Reclaiming the American Dream," the surest path to economic vitality and strength in the middle class is through education (American Association of Community Colleges, 2012). Given that roughly one in five Americans experiences disability (Brault, 2012), and at least one in ten college students report the same (U.S. Government Accountability Office, 2009), it is essential that the path through education to career be accessible.

If we want to increase economic vitality and strengthen the middle class, we have to reconcile the fact that Americans with disabilities are twice as likely to live in poverty, and half as likely to be employed (Brault, 2012, Erickson et al., 2014). Put simply, we are

failing to ensure equitable access to education and employment for individuals with disabilities, and it is a problem. We can see this in the way that funding for education in K-12 varies by zip code (Ogletree & Jenkins, 2016), or in the way that Special Education identification and placement varies by race (Grindal et al., 2019) with "White privilege and racialized conceptions of ability…allow(ing) some parents and educators to use certain special education categories as a tool for continued racial segregation" (Ferri & Connor, 2005 p. 454).

Disparities in outcomes for students across socio-economic status and race/ethnicity can be predicted and observed time and again and in higher education. Higher education is a privilege that is dependent on not just merit, but also ability to navigate institutional environments and practices that may be racist, ableist, and designed to serve as gatekeepers rather than gateways (Dolmage, 2017). This makes it imperative that educators take a critical and questioning approach to the work we do.

This research took a comparative quantitative approach that was informed by disability studies, and focused on examining outcomes, in the form of final grades awarded, at a large urban community college, using records from a four-year timeframe. The literature review focused first on the critical quantitative approach itself, then moved into an exploration of the disability experience, and role of accommodation, with recognition of the movement from individual rights toward more collective disability justice, and finally provides a review of the current and historical landscape of research approaches focused on postsecondary students with disabilities. It closes with a summary related to the research approach and description of how the literature forms the basis of the theoretical framework that guides the research.

Critical Quantitative Research

Over the last few decades, there has been a growing interest in critical quantitative research, which has three primary aims:

- using data at large scale to reveal inequalities in processes and outcomes,

- questioning models, measures, and analytic practices in order to offer competing practices that could better represent the populations under study, and

- conducting culturally relevant research by studying institutions and people in context (Wells & Stage, 2015).

It is important to acknowledge that while quantitative study is often viewed as being objective, "the numbers are given voice largely by the theoretical underpinnings upon which they rest (p. 270)" and because quantitative methods are linked so tightly to roots in eugenics and White supremacy, an alternative framework is needed (Covarrubias & Vélez, 2013). Researchers advocate for not "casting racial data as a variable that can lead to causal effect findings, but providing racial statistics that can lead to a more equitable approach to addressing past injustices (Covarrubias & Vélez, 2013, p. 273)." Rather than homogenizing heterogeneous groups we need to disentangle and disaggregate.

There are also specific considerations when looking at critical quantitative research designs aimed at revealing inequalities in outcomes for students with disabilities. Scholars warn researchers to ensure they are well grounded in critical disability studies, carefully select the research questions and unit of measurement to avoid perpetuation of a deficit model, but also carefully consider how to aggregate and disaggregate in ways that

acknowledge the heterogeneity of the population, and ensure research is woven into practice in concert with disabled people (Vaccaro, 2015).

Critical Disability Theory

In 2005, Rocco shared a piece titled "From Disability Studies to Critical Race Theory: Working Towards Critical Disability Theory" at the Adult Education Research Conference. The principles that were outlined included:

a. disabled people have a unique voice and complex experience,

b. disability should be viewed as part of a continuum of human variation,

c. disability is socially constructed,

d. ableism is invisible,

e. disabled people have a right to self-determination, and

f. the commodification of labor and disability as business combine to maintain a system of poverty and isolation.

As a methodology, critical disability theory requires questioning the assumptions around who is considered disabled due to impairments of bodily or mental functioning, and also explicitly recognizing that "disability is disproportionately concentrated within communities of color, which receive unequal health care and experience elevated risk of experiencing workplace injuries, environmental contamination, and state violence (Minich, 2016, para 7)." DisCrit is a powerful theoretical framework that attempts to bridge gaps between Disability Studies and Critical Race Theory. It "seeks to understand ways that macrolevel issues of racism and ableism, among other structural discriminatory processes, are enacted in the day-to-day lives of students of color with dis/abilities (Annamma et al., 2013, p. 8)."

By understanding and approaching critical disability studies as a method of analysis, we can move away from the need to define disability status in narrow terms, and instead explore disability "in parallel with terms in related identity/oppression/social justice fields…overarching terms that designate both marginalized… and privileged positions (Schalk, 2017, p.2)." This is critical because when we limit our conceptualization of who is disabled to the subset of individuals who have been able to procure medical documentation and prove they meet the legal definition, we limit our capacity to understand.

Disability is an "identity category that anyone can enter at any time, and we will all join it if we live long enough (Garland-Thomson, 2002 p. 20)" so rather than dreading the day we do, we could, as Patty Berne has said, recognize that "we are powerful not despite the complexities of our bodies, but because of them (2015, para 12)" and see each other as whole, however we are. As noted by Shakespeare, "rather than relying on the traditional narratives of biomedical intervention or rehabilitation, of misery, decline and death. Doing it for ourselves, perhaps we can reconcile tensions and produce alternative, happier endings (1996, p. 95)." This is especially important given that Deaf, trans, and mad communities have had a "contentious relation to the category of disability (Withers et al., 2019, p. 180)" at all.

We could recognize that "there is no neutral body from which our bodies deviate" (Morales quoted in Berne, 2015 para 4). Disability is not just about acknowledging the functional limitations that exist within any individual human. Disability is about acknowledging that the way we think and feel about these functional limitations is interwoven with our socialization.

The Disability Experience

There are many ways to think about disability, and in recent decades much discussion has occurred around the distinction between a medical model of disability in which the focus is on individual functional limitations, and a social model, in which functional limitations are neutral, and barriers are a result of environments and activities being built without consideration of diverse human needs (Scope, 2022). That said, there also have been calls to recognize that disability studies and the medical model are inextricably linked, and rather than being at odds, should inform each other (Evans, 2004).

There are also criticisms of the social model for not recognizing positive aspects of disability and for not fully acknowledging the contextual nature of disability in terms of both different functional limitations and different social environments. In fact, the very idea of disability as "the grouping together of individuals perceived as lacking normal powers of body or mind (Silvers, 2003 p.471)" has been a relatively recent phenomenon, though there is a long history of societies identifying individuals to receive entitlements on the basis of impairment.

Though there has been much interesting history around the treatment of disabled people in different time periods and geographic areas (Disability History Exhibit, 2002), it is the legal construct that continues to reign supreme in the United States. Within that framework, disability means, with respect to an individual, a physical or mental impairment that substantially limits one or more major life activities; a record of such an impairment; or being regarded as having such an impairment (ADA, 1990).

This legal definition was clarified with the Amendments Act of 2008, but retained the essential triple pronged approach established in Section 504 of the Rehabilitation Act (1973) and the ADA (1990). The legal definition of disability is critical to understanding who is protected in terms of basic civil rights, and what remedies exist should those rights be violated. That said, the reliance on medical definitions that view disability as an impairment within the individual are often a limiting factor in terms of gaining true access (Varney, 2013).

The writings of modern disability scholars (Syracuse, n.d.) affirm that disability cannot be conceived of as a purely medical, or legal, or social construct. Even though race and disability are socially constructed, not necessarily biologically real, there are real and specific consequences of labeling (Annamma, et al., 2013) and the quest for a "a neutral conception of disability, one that neither devalues disability, nor implies that persons with disabilities are inadequate (Silvers, 2003, p.471)" remains elusive. Even if disability scholars agree that "disability identity is about stories, having the space to tell them, and an audience which will listen (Shakespeare, 1996 p. 113)" in American Society, it is still the medical and legal frameworks that reign supreme, and "the consequences of simply being labeled as disabled, even if one does not claim that identity, can result in rejection from cultural, racial, ethnic and gender groups (Annamma, et al., 2013, p.8)."

Disability and Accommodation

In the United States, institutions receiving federal funding are responsible for ensuring individuals who experience disability have equal access to programs and services (ADA, 2008; Section 504, 1973). While younger adults may not have known a

time without these civil rights protections in place, the reality is that like other aspects of social change, the process of establishing enforceable disability rights protections was long and complicated (Advocating Change Together, 2015; Pelka, 1997). It took significant grassroots efforts, advocacy, and persistence to get the passage of Section 504 of the Rehabilitation Act (1973), and four years later, it took a massive sit-in to finally get the regulations for enforcement to be established (DREDF, 1997).

Under Section 504, recipients of federal funds must ensure they do not deny participation or exclude individuals based on disability status and must provide a mechanism for otherwise qualified individuals who experience documented disabilities to make a reasonable request for accommodation. Colleges and universities responded to this federal mandate by implementing policy at the institutional level and developing procedures and grievance processes to facilitate the accommodation process (Gordon & Keiser, 1998; Jarrow, 1997; Kincaid, & Simon, 1994; Lewis & Farris, 1999; McEllilstrem et al., 2001; Raue & Lewis, 2011; Stodden et al., 2001; Toma & Palm; 1999; Trammel, 2003; Wolanin & Steele, 2004; Walling, 1996).

The basic accommodation process typically requires students to supply documentation, then designated officials review requests, and finally faculty implement just those pre-approved accommodations. This overall process remains very much the same at many colleges and universities even though there is considerable variability in terms of each institution's approach to implementation (Tagayuna et al., 2005).

In addition to Section 504 of the Rehabilitation Act (1973) as enacted (1977) which established the need for recipients of federal funds to provide reasonable accommodation when requested, another critical piece of legislation is the Americans

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with Disabilities Act (1990) as Amended (2008) which broadened the protections of civil rights and established an affirmative obligation to promote the full participation of people with disabilities in services and programs.

With the passage of the ADA, colleges and universities were prompted to develop transition plans to document how barriers in their environments would be identified and mitigated over time. Unfortunately, there have not necessarily been policy and practice changes to truly shift the approach away from relying on accommodation to one of ensuring inclusion.

In reviewing a legal landscape punctuated by civil rights complaints and lawsuits (Disability Rights Advocates v University of California, Berkeley, 2013; NFB, 2009; Resolution, 2013; Resolution, 2014; U.S. Department of Justice, 2013; U.S. Department of Justice, 2015, April 1; U.S. Department of Justice, 2015, May 15), the unfortunate reality seems to be that the civil rights of disabled learners are routinely violated. Rights are routinely violated not because educational institutions fail to understand their legal responsibilities, but because institutional practices continue to rely almost exclusively on the accommodation process, which is a process best considered a necessary but not sufficient element in an overall approach to ensuring equity and fairness (Vance et al., 2013; Worley & Cornett-DeVito, 2007).

While the focus here is on disability in higher education, legislation related to K-12 is also critical – the Education for All Handicapped Children Act was enacted in 1975 and reauthorized in 1990, then again in 2004 as the Individuals with Disabilities Education Improvement Act. Over time, they have led to greater integration – meaning that adults who went to school prior to these regulations most likely did not interact with

classmates who experience significant disability, whereas adults who went through public

school more recently, have been more likely to have had those experiences.

It is also important to note that the Higher Education Opportunity Act

Reauthorization of 2008 created an advisory committee for instructional material

accessibility (AIM, 2011), and provided funding to develop comprehensive transition

programs for students with intellectual disabilities in addition to established funding for

demonstration projects aimed at improving educational outcomes for postsecondary

students with documented disabilities.

Even without federal funding, there have been many frameworks and activities

aimed at promoting more inclusive approaches. The best known is Universal Design,

which is defined by Mace (CUD, 1997) 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 (para 6)." The term originated in Architecture then spread to the

design of objects, learning materials and activities, workplaces, and more. There were

several rounds of FIPSE grants that helped UD or UDI or UDL gain traction in some

colleges and universities, especially during the specific time frames in which grant

funded efforts served as motivators, but to be clear, the ADA has not prompted colleges

to fully operationalize practices that enable access at the institutional level, instead there

continues to be a reliance on individual accommodation.

This is problematic because even though most faculty are willing to follow

institutional policy and implement accommodation when formally requested, there can be

a perception among some that doing so compromises academic freedom and lowers

standards (Bourke et al., 2000; Jensen et al., 2004; Scott, 1997) and "instructors who

occupy a position of institutional vulnerability as adjunct, temporary, or untenured faculty may find meeting students' access needs overwhelming and, in some cases, unachievable; this is especially true when teachers have unmet access needs of their own (Minich, 2016, para 8)."

Furthermore, while there are a range of auxiliary aids and services that may be available through an individualized and interactive accommodation process (Raue & Lewis, 2011; Stodden et al., 2001), accommodation is typically focused on addressing structural barriers, not attitudinal barriers. In an institutional culture where disability access is expected to be achieved through accommodation, the barriers that exist because staff, faculty, students, even those who are disabled themselves, have the potential to adopt limiting beliefs and to judge unfairly based on perception (Handicrap, n.d) often remain unaddressed.

The reliance on accommodation is not only flawed because of the narrow nature of the type of barriers it can impact, but also because the procedures that govern the provision of accommodation for disabled students at colleges and universities are prone to becoming overly bureaucratic and difficult to navigate for individuals who are not coming from the dominant culture (Funckes et al., n.d). The combination of attitudinal barriers, inconsistent or overly bureaucratic procedures, and other factors, mean that many students with disabilities do not elect to self-disclose disability status or use the academic accommodation process (Barnard-Brak et al., 2010; Marshak et al., 2010).

For students who are willing to navigate the process, there is typically a requirement to provide disability documentation as the first step in establishing the right to request accommodation. This is true at almost all colleges and universities, and while

the Association on Disability and Higher Education has modified the guidance offered to postsecondary institutions, placing more emphasis on the student's experience and less on third party diagnostic reports (AHEAD, 2012), at many institutions there continues to be a reliance on "objective" evidence.

Diagnostic evaluations to confirm the presence of learning disabilities can cost well over a thousand dollars. Ideally, learning disabilities are identified and diagnosed in K-12 but school personnel may or may not have identified a need, and school districts may or may not have offered to conduct a diagnostic evaluation. If parents have the time, energy, and expertise to advocate for their child, it can help, but if a student leaves K-12 without a recent diagnostic report in hand, it becomes an out of pocket expense that has the potential to keep already disempowered individuals out of higher education, and the entire process sends implicit messages that "disabled students are unreliable and not trustworthy" (Funckes et al., n.d.).

From Individual Disability Rights to Collective Disability Justice

Disability Justice is a term that was coined in 2005 by a collective of disabled queer women of color. It builds on the disability rights movement and serves as a framework to examine ableism as it relates to other forms of oppression. The idea is that ableism is complex, and if we focus just on individual rights, we miss the opportunity to address inequities (Berne, 2015).

To understand what this means, consider an example. While legal protections establish the right to education, those rights do not guarantee that education is actually equitable. The literature shows that White college students are often overrepresented in the population of students with disabilities relative to students without disabilities (Reid

& Knight, 2006). Race/ethnicity as well as parent income and involvement all seem to impact the likelihood of students benefiting from higher education (Newman et al., 2011; Reid & Knight, 2006). This can be further contextualized with an understanding that African American students are 45% more likely to be identified as having emotional and behavioral disorders (Snyder & Dillow, 2013) and 53% of students with those types of diagnoses drop out of high school (Trainor, 2008).

As another example, consider how access to mental health services may exist in a community, yet individuals raised with strong cultural norms and taboos about mental health may be unable to use those services without experiencing alienation, leading to greater isolation and less community. When we rely on individuals to request accommodation rather than relying on institutions to ensure access, we must be aware that those with more privilege may be more likely to benefit.

Current and Historical Research on Students with Disabilities in Higher Education

As indicated in a recent Research Brief from the National Center for College Students, even though there have been longstanding efforts to collect disability related data, the questions in most surveys are limited to disability status and type, and tend to be peripheral, or supplemental to the main objectives of the databases (Avellone & Scott, 2017). In fact, a recent chapter aiming to provide a comprehensive review of literature regarding students with disabilities in higher education went so far as to say that "the research community does not really understand the climate-related experiences of students with disabilities" (Kimball et al., 2016, p. 107). This is troubling given postsecondary students have continued to indicate that discriminatory attitudes and

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assumptions about ability negatively impact them and can serve as barriers to accessing

educational supports (Baker et al., 2012; Dowrick et al., 2005; Yssel et al., 2016).

Even when studies have focused on disability as a more central aspect of inquiry,

the literature reveals inconsistent findings, in part, because the way in which disability is

defined and categorized vary considerably, making it difficult or impossible to compare

findings from different studies. There is a general dearth of data regarding the teaching

and learning practices that are most effective in giving students with disabilities the

support they need to thrive, especially when compared to research that can be found in K-

12 (Kimball et al., 2016; Swanson et al., 1999), but in particular, there is a lack of

discipline-specific inclusive teaching practice research in higher education (Higbee &

Goff, 2008; Madaus, Gelbar, & Dukes et. al, 2021). One of the areas in which there has

been targeted funding for research is Science, Technology, Engineering, and Math

(STEM) fields (NSF, 2013). In part this is likely due to the good income earning potential

for graduates of those programs (Joint Economic Committee of the US Congress, 2014),

however an assessment of funded projects affirmed "a surprising amount of

discrimination" as well as "low expectations and insufficient access to challenging

academic curricula…in special ed" and an overall "lack of access and accommodations

(Thurston et al., 2017, p. 52)."

The bottom line seems to be that while it is always a combination of the

characteristics a student brings with them, the characteristics of the institutional

environment, and the experiences the student has within the environment, that together

shape outcomes such as final grade awarded, the ways these variables interact are

especially complex for students with disabilities (Kimball et al., 2016). While there have

been a variety of studies focused on persistence and completion, because there is so much heterogeneity in the combinations of students, academic disciplines, and institutional environments, the results have presented a picture that is far from clear.

Persistence and Degree Completion

While some studies have indicated that students with disabilities are retained and complete at lower rates than their peers, other studies have confirmed similar rates for persistence and completion. In 1999, the National Center for Education Statistics (NCES) issued a descriptive analysis report titled Students with Disabilities in Postsecondary Education: A profile of preparation, participation, and outcomes. The report analyzed four surveys conducted through NCES and found that only 6% of college students reported experiencing disability, and that overall, students with disabilities were significantly less prepared to meet college requirements upon completion of high school, and once enrolled in college, were less likely than their non-disabled peers to have attained a degree or certificate or still be enrolled after 5 years (Horn & Berktold, 1999).

A study using data from the national Beginning Postsecondary Students Longitudinal Study examined demographic and institutional characteristics of students with disabilities at 2 year institutions who first enrolled in college in 2003, and found that roughly three quarters of students persisted from year 1 to year 2, while around half made it to year 3 – further, the researchers found that while social and academic integration as well as disability related accommodation use were associated with persistence, when controlling for other demographic and institutional characteristics, they were not significant predictors, however first-year Cumulative GPA was one of the significant predictors (Mamiseishvili & Koch, 2011).

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A longitudinal study from Ball State University confirmed that the retention and graduation rates for students with disabilities were similar for all students, regardless of disability status, except for a few fluctuations in 2005 and 2006 (Wessel et al., 2009). And from Canada, an archival study compared academic outcomes of students with and without disabilities over a 12-year period and found virtually identical grades and completion rates, though students with disabilities tended to take longer to graduate (Jorgensen et al., 2005).

Social and Academic Integration

While a majority of the research on student persistence is most directly applicable to university settings, there are some meaningful patterns for two-year college students with disabilities. For example, a study of undergraduate students with Learning Disabilities (LD) examined the degree to which academic and social integration played a predictive role in retention and College GPA, and found that while neither integration variable was significant in terms of predicting GPA, social integration may be more impactful than academic integration when looking at intent to persist, hypothesizing that perhaps if "students with LD have greater difficulty with the academic arena of college than do students without LD, persisters with LD compensate by relying more on their social support system (DaPeppo, 2009, p. 128)." The researcher acknowledged that while their study failed to confirm the impact of background characteristics, this could be because the sample was not very diverse – in fact of the 97 students included in the study, 89% of them were White with highly educated mothers (DaPeppo, 2009).

In 2010, Adams and Proctor looked at adaptation to college and found that even though students without any known disability status scored higher for overall adaptation,

social adjustment, attachment to institution, and semester GPA, in more specific areas of academic adjustment, students with disabilities scored fairly consistent with their non-disabled peers, and after controlling for age and level educational experience, the two groups rated the difficulty level of college work similarly.

This study also explored variables that could contribute to a predictive model for adaptation to college on the part of students with disabilities and found that both self-advocacy skills and visibility of disability were significant, with implications that even if academic accommodation is effective in "leveling the playing field" for students with disabilities, resulting in similar GPAs, students with disabilities could still be at greater risk academically because of feeling like they do not fit in, (Adams & Proctor, 2010). A study from Dong and Lucas (2013) took an interesting approach, using Tinto's model as a conceptual base, and building off the work of Getzel et. al. (2004), Trammell (2003), and Troiana et al. (2010), they added to the body of research findings showing that students who disclose disability status and register with the Disability Services office do better academically than students with disabilities who do not.

Trammell had published work in 2003 that looked at students with LD or ADD in particular, and used SAT scores as a baseline predictor, to evaluate whether use of accommodation was related to a differential increase in end-of-term grades. The SAT score as well as the year in school were good predictors, however in terms of accommodation, the benefit was there for ADD students, but the results were mixed for students with LD (Trammel, 2003). Interestingly, rather than discussing bias, stigma, or questioning the ineffectiveness of implementation, Trammel said: "it is possible that students with LD in this study who generally did not experience grade improvement also

did not make good accommodation decisions (2003, p. 84)" which seems to reinforce a notion that if accommodation is not effective, it is because the student was not effective enough. However, in 2009 Trammel wrote an article titled "Red-Shirting College Students with Disabilities" in which he said that students with disabilities are put in a position of needing to "control and protect their stigmatized identity" and that "disclosure may create as many problems as it solves (2009, p. 21)" which has significant implications for the way colleges and universities approach their mandate to ensure equitable access for this heterogenous population of students.

Barriers to Accommodation

Research confirms significant barriers to accommodation effectiveness. According to the National Longitudinal Transition Study, only 37% of the students who received special education in high school identify disability at the post-secondary level, and only 24% actually use accommodation (Newman et al., 2009). Students may refrain from self-disclosing out of a desire for self-sufficiency, or desire to avoid negative social reactions (Lyman et al, 2016; Marshak et al., 2010), or they may feel that the accommodation offered would be ineffective because the process of determining eligibility was overly focused on third party diagnostic reports, and fails to consider the full context of their lives (Kurth & Mellard, 2006).

Unfortunately, even assuming a student does formally disclose and use the accommodation that is offered, research has confirmed that faculty are not always willing to put that accommodation in place (Vogel et al., 1999; Dorwick et al., 2005) and may be less likely to assume students with disabilities are capable of meeting program requirements, and more likely to assume that students either do not need, or already have,

any supports that would be appropriate (Baker et al., 2012; Rao & Gartin, 2003). This is concerning given that low expectations can serve as a barrier to success (Dorwick et al., 2005) and when faculty question students on the legitimacy of their requests or direct negative statements toward them, it leads to a difficult classroom climate (Kurth & Mellard, 2006). The willingness to provide accommodation may also vary as a function of department affiliation, previous teaching experience, and legislative knowledge (Rao & Gartin, 2003).

Even with considerable variability in the research, the picture that emerges is one where students with disabilities are in a difficult position. They are navigating a postsecondary landscape in which accommodation is sometimes effective and helpful, but sometimes disclosure of disability status and use of accommodation has more negative consequences than positive ones.

When researchers have queried students who are eligible for accommodation, and asked specifically about the barriers they experience, there have been consistent themes, though there have also been severe limitations in this research, especially in regard to the degree to which diverse lived experiences have been included and addressed. For example, a qualitative study with interviews of 16 students from a university, all identified as White, and most were women – the themes that emerged from their work included identity issues, a desire to avoid negative social reactions, insufficient knowledge, perceptions around the usefulness of accommodation offered, and negative experiences with instructors (Marshak et al., 2010).

Lyman et al did a similar study in 2016 in which there was a more balanced split of male and female students within the group of 16 who were interviewed, but once

again, the participants were almost all White, and came from a private religious university. The themes that emerged included a desire for self-sufficiency, a desire to avoid negative social reactions, insufficient knowledge of the accommodation process, perceptions of usefulness of the accommodation offered, negative experiences with instructors, and fear of future ramification.

These barriers that are consistently found, are a problem, not just for the individual students who are impacted in negative ways, and not just for the institutions who want to improve retention and graduation rates, but also for our society. The literature suggests that academic outcomes for students with disabilities have been evaluated in limited and inconsistent ways, and often with a disproportionate focus on those individuals who had the cultural knowledge and resources necessary to navigate the formal academic accommodation process.

A Need for Access Beyond Accommodation

A 1999 study of nine community colleges in three states looked at components such as recruitment, accommodation, and attitudes toward students with disabilities, with findings that pointed to inconsistencies even when support services were available; barriers related to housing, transportation, and communication about services, as well as a lack of training for faculty and staff – all warranted interventions to educate personnel and address negative attitudes and behaviors (Lancaster et al., 2001).

These same needs were re-affirmed in a more recent study of students with learning disabilities attending an urban community college. Recommendations included training for faculty and staff, but also more aggressive approaches to ensure students are aware of disability related services; offering disability services as a regular part of student

intake and advising processes, and ensuring materials are written in varied languages at appropriate reading levels (Flink & Leonard, 2019).

In 2009, the US Government Accountability Office published a report titled "Higher Education Needs a Coordinated Approach." This report reviewed federal data sources, conducted site visits and telephone interviews, and confirmed that "the population of postsecondary students with disabilities…demographically, closely mirrors students without disabilities (p. 8)" and "the number of students with disabilities pursuing postsecondary education is growing and this will further challenge…schools' capacity to effectively meet their educational needs (p. 32)," arguing for more coordination among the government offices tasked with provision of technical support for colleges and universities (2009).

Research Approach

American postsecondary institutions rely on accommodation to ensure access for disabled students, yet seldom evaluate the degree to which accommodation is actually effective, or take into account the reality that many (if not most) of the students who experience disability either do not know about the accommodation process, or choose not to use it (Kimball et al., 2016). In order to ensure greater equity in terms of access to education, community colleges need to understand the barriers that have continued to limit participation and "not assume that formal accommodations are the only answer to providing support to disabled students" and "break down internalized assumptions regarding disability that are informed by deficit frameworks pervasive in our postsecondary environments" to create more inclusive learning environments (Nachman & Wilke, 2021, p. 52).

Recommendations from the literature include training for faculty and staff, increasing awareness of the accommodation process, putting more of a universal design approach in place, and destigmatizing disability as an aspect of identity. Formal research is one way to assess and improve, but there are also benefits to incorporating evaluation activities in existing activities.

More specifically, if colleges and universities approached disability in a manner more akin to the ways other systemically marginalized aspects of identity are approached, it would be a good thing. The inclusion of disability in the demographics tracked and reported through institutional effectiveness for use in program reviews is a place to start.

Disability is part of the identity and experience of an ever-growing percentage of college students, yet disability is seldom included in campus discussions about diversity and equity (Kimball et al., 2016). The literature reveals a dearth of research that explores existing data, using aggregation and disaggregation to illuminate nuances and relationships that could spur discussion and reflection. This is unfortunate given the degree to which institutional data sets are often used to drive change internally. Metrics that can be compared over time and filtered to focus on particular areas could be useful in work to address systemic oppression and increase equity in terms of who has access to participate and succeed. Academic leaders and instructional faculty who use data sets to identify disproportionalities, and in turn use that information to improve teaching and student support, should have access to data that includes disability as a subpopulation of interest, and to the degree possible, the data should include not only those students with disabilities who use accommodation, but also those who do not.

Effective teaching and learning depends, in part, on being responsive to learners (Brookfield, 2001; Gadbow, 2002; Hodge & Preston-Sabin, 1997). If we can see from a survey of the legal landscape that current policies and politics are failing students (Resolution 2013; Resolution 2014; U.S. Department of Justice, 2013; U.S. Department of Justice, 2015 April 1; U.S. Department of Justice, 2015 May 15), and if we can see that the accommodation process alone is simply insufficient, then it becomes critical for us to turn our gaze inward.

Put simply, inaccessible curricular offerings cannot be addressed by focusing solely on the students in the classroom. If progress is to be made, it will be through the development of a greater sense of shared responsibility (Vance et al., 2013) and an honoring of employees as learners who should be supported and nurtured in the development of skills that promote accessible and inclusive learning opportunities.

Literature Review Summary

Colleges and universities in the United States rely upon accommodation as a primary mechanism for ensuring students with documented disabilities are afforded equal access to education (Stodden et al., 2001). Policies tend to mirror the language of Section 504 of the Rehabilitation Act (1973), outlining procedures by which otherwise qualified individuals who experience documented disabilities can request reasonable accommodation (Raue & Lewis, 2011; Shallish, 2015; Stodden et al., 2001; Wolanin & Steele, 200). Beyond the accommodation process available within the postsecondary educational institution, there are also broader civil rights protections afforded through the ADA (Americans With Disabilities Act, 1990; ADA Amendment Act, 2008), and standards that specify expectations for accessible design in both the built (United States

Access Board, n.d.) and digital environments (W3C, 2015). Although there are protections in place and accommodation is available upon request, educational opportunity has not tended to produce the same benefits for disabled people.

While there are longitudinal studies tracking graduation rates for students with disabilities over time, and government reports confirming the type of accommodation frequently put in place by educational institutions, literature reviews have revealed sparse reporting on educational outcomes for students with disabilities who use accommodation (Kimball et al., 2016; Shallish, 2015) and outcomes for students with disabilities are seldom included in institutional effectiveness reports (Thompson, 2016), or if they are, it is through a "special report" rather than part of standard practices. If colleges are not tracking outcomes for students with disabilities, they may be less interested in listening to disabled student's voices, and less able to make strategic improvements over time.

This is a problem because disability continues to be correlated with higher rates of discrimination, lower rates of employment, and higher rates of poverty (Brault, 2012; Houtenville, 2003; Hughes & Avoke, 2010). We need additional research, and in particular, we need research that "aims to disentangle data that often camouflages the interests of the dominant group (Covarrubias & Vélez, 2013, p. 275)" to motivate policy and practice changes that could improve outcomes. The following chapters outline the methodology used in this study as well as the findings and implications.

Chapter Three: Research Methodology

Individuals who experience disability are members of our society, and members of our communities. Each college or university in America has disabled students who are enrolled in courses, and while this aspect of their identity may be known, or unknown, the academic outcomes, and the degree to which they are consistent with the outcomes of students more broadly, can and should be a topic of research. A comprehensive review of the literature has shown that:

- ableism and racism are inextricably woven together in a complicated history.

- those with more privilege may be more likely to benefit from accommodation.

- when accommodation is used, it may mitigate some barriers (structural) while increasing others (attitudinal).

- when institutions fail to study outcomes for students who experience disability and may or may not use accommodation, they may be less likely to identify areas where barriers are more persistent and in need of attention.

- equipping educators with relevant data regarding the outcomes for students who self-disclose disability status can help drive innovation and ensure accountability.

This research was conducted by a practitioner who serves as a leader in a large urban community college, who experiences disability directly, and who recognized the problem of colleagues not having sufficient relevant data available. This study explored a comprehensive data set to analyze final grades awarded to students with disabilities, who do and do not use the accommodation process, compared to their non-disability identifying peers.

This study looked at the relationships between final grades awarded, disability status, and student or course characteristics, as well as the relationships between accommodation use and subject, grouped by pathway. The research used a critical quantitative approach that relied primarily on contextualizing commonly available institutional data, in the hopes that other practitioners and administrators might see value in replicating aspects of this type of work at their own institutions.

Purpose

This exploratory study analyzed existing institutional data to gain a better understanding of the relationships between disability status, accommodation use, and final grade awarded. The ex post facto design focused analysis on how factors which were present prior to the study, related to a dependent variable (final course grade). Both student and course related variables were brought into focus to identify statistically significant differences, and illustrate variation between grade distributions across disability and accommodation use status in courses grouped by academic pathways.

Research Questions

The research questions that guided this study were focused on the relationships between final grades awarded and disability status, accommodation notification, and student or course characteristics. Strategic questions zeroed in on areas of particular interest identified in the literature. Rather than focusing on the labels assigned to students through diagnostic reports, the research questions centered first on students who self-identified disability status to the college, then again more narrowly on disclosure of accommodation eligibility to faculty. Throughout – it was the students who had elected to disclose who were at the center of this study – the comparisons were to their classmates.

The Course GPA was selected as the primary dependent variable because it is a measure of success that is very granular, which was necessary given the questions being researched. While Cumulative GPA is a summary statistic that represents an average of all grades a student has been awarded over time (up the point of calculation), the Course GPA is a summary statistic that represents an average of all grades awarded to many students, each of whom was registered in a particular course, with a specific accommodation status in place.

Each student who discloses disability status to the college has a Cumulative GPA that is potentially based on significant engagement in college work that was completed prior to disclosure, and thus prior to having eligibility for accommodation. A student who is taking a particular course in a particular term is bringing that Cumulative GPA with them, as they are either notifying their instructor of their eligibility for accommodation, or not. Thus, the Course GPA is capturing a measure of student success that is specific to accommodation notification status, while the Cumulative GPA is a measure of prior success across all prior disability disclosure and accommodation use statuses.

Because this research took a very detailed approach to examining how disclosure, along with student and course characteristics, related to the final grades assigned, Course GPA was used as the dependent variable while Cumulative GPA, which is generally understood to be the best predictor of Course GPA (Bacon & Bean, 2006), was used as a demographic characteristic. The continuous Cum GPA was converted into a categorical variable with two groups, students who have a Cum GPA of 3.0 or above, and those with a Cum GPA that is lower than 3.0. This decision was informed by an exploration of descriptive statistics, as well as use of classification trees to highlight the relative

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importance of potential variables. The research questions themselves were addressed via non-parametric comparison of means. The research questions were:

- RQ1: Are there statistically significant differences in the average Course GPA, when records are grouped by demographic characteristics then compared across disability status?

- RQ2: Are there statistically significant differences in the average Course GPA, when records are grouped by delivery method then compared across disability status?

- RQ3: After grouping records by Cum GPA, are there statistically significant differences in the average Course GPA, when records are further grouped by Academic Pathway and compared across accommodation status?

Addressing these questions provided an opportunity for a critical analysis of the relationships between student outcomes and disability status disclosure and accommodation use. By interrogating the data and organizing the analysis with a focus on academic pathways, the patterns gleaned could have a greater potential to be useful to academic leaders who are positioned to influence outcomes.

While quantitative data alone is unlikely to be sufficient motivation for change, if leaders are aware of gaps and disparities in the areas they are responsible for, they may be more motivated to invest in professional development that brings student voice, and experiential knowledge into focus. If academic leaders and instructional faculty have access to both quantitative and qualitative data, as well as support and encouragement to engage, it may be more possible to reduce barriers experienced by disabled students.

Research Setting

Community colleges with open enrollment policies are meant to create space for people to transform their lives, however even though "the open-door policy that community colleges embrace is intended to democratize opportunities, completion remains correlated with socio-economic advantage (Goldrick-Rab, 2010, p. 438)" and even though "more SWD are participating in postsecondary education, and more often than not, they are attending community colleges (Madaus, Gelbar, & Dukes et al., 2021)" the rates of persistence and completion for these students can be low (Mamiseishvili & Koch, 2012).

This exploratory ex-post-facto study analyzed existing institutional data to gain a better understanding of the relationships between disability status, accommodation use, and final grade awarded. The data used in the study was obtained from a large multi-site open enrollment community college in the Pacific Northwest serving roughly 75,000 students annually through a wide variety of programs across 4 comprehensive campuses and 16 centers. The institution was in a predominantly White city, in a predominantly White state. Gentrification has pushed many residents to the outer margins of the service area and there were known persistent equity gaps on the basis of race well documented within the historical set of institutional effectiveness reports.

This research setting was selected because community colleges have a critical responsibility to question ableist and racist assumptions and practices. Research aimed at uncovering inequities and challenging conceptions is needed to help people "unlearn" what they think they know. If education is to serve the community, we must disrupt the status quo.

Positionality

The researcher was a practitioner and leader in higher education employed at the institution where the data was generated and collected. Given the working relationships with faculty teaching the courses, as well as the supervisory relationship with the personnel engaged in facilitating the accommodation process, there was clearly a vested interest in this research. Each of these aspects of identity informed the decision to invest time and energy in studying relationships between disability, accommodation, and academic outcomes, but more specifically, these aspects of identity also impacted decisions around how to structure research questions and methods of inquiry.

The researcher was motivated to develop recommendations that could be applied to practice and impact operations in positive ways. The researcher was also motivated to share the outcomes of the study with colleagues directly, and to follow-up with additional studies as part of a continual improvement process aimed at increasing institutional capacity to promote equitable student success.

The researcher experiences disability directly, in the form of a rare hereditary nerve condition that impacts the longest of the motor nerve fibers, thus impacting gait in a progressive and degenerative manner. While the specific type and nature of disability did not produce functional limitations impacting participation in education, and thus the researcher did not use accommodation herself as a student, the social and cultural aspects of being disabled, and being a part of a family with a hereditary condition, informed her identity as a woman, wife, and mother. In turn, this experiential knowledge also influenced the researcher's approach to working with colleagues, students, and community members within her role as a disabled leader in higher education.

Limitations

This study contributes to the field of disability in higher education, but because the research was focused on a single institution, the results will not be able to be generalized. An additional limitation is that students with disabilities who had not elected to formally disclose to the college via Disability Services were not able to be identified, and thus, were counted within the population of students with no known disability status. Also, the research focused on accommodation notification, but in reality, once notification has been provided, it is difficult to know the degree to which accommodation has actually been effectively implemented. In addition, while there were measures in place to ensure internal consistency, it must be acknowledged that there is a level of subjective judgment that comes into play when individual college employees make determinations around eligibility for students as they engage in the interactive process.

Data Collection Process

This exploratory study involved secondary data review. The first source from which data was obtained was the accommodation management system used by the college to store information related to student disability status and the provision of auxiliary aids and services. The second source from which data was obtained was the student information system used by the college to store demographic, registration, and grade information. Data were first exported from the student accommodation system. This data included the term by term disability status, accommodation eligibility, and accommodation usage information for each student with an active profile within the accommodation management system. In addition, data for students who had initiated contact with Disability Services but had not yet completed the steps necessary to

establish an active profile, were extracted from the application module of the accommodation management system and added to the dataset. Lists of ID numbers were then compiled per term, with status specified as either a student with disability (SWD) or a student who disclosed disability in a future term (Pre-SWD). The same student might have been a Pre-SWD for some of the terms, and a SWD for others, or might have been a SWD for all terms. These lists were provided to the college's office of Institutional Effectiveness.

For each course within the range of Fall 2014 through Summer 2018, if there was at least one registration on the part of a student with SWD or Pre-SWD status, the term specific course request number (CRN) was included in the data pull. When a CRN was included, the course specific characteristics were captured, and for each student who was registered, the demographic variables were captured as well as the final grade awarded.

An export file for each term was provided by Institutional Effectiveness that included rows for students whose ID was included in the original input file as well as rows for their classmates. Course specific details included subject, course number, location, day, time, and method of delivery. Student specific details included final grade, demographic information including race/ethnicity, age, gender, Cumulative GPA, and Term GPA.

Variable Definitions

This study provided an opportunity to center disability status and accommodation use when examining academic outcomes in the form of final grades awarded. Key terms and definitions follow. First the primary outcome variables used to address the research questions are defined, then each of the student and institutional variables are described.

Primary Outcome Variables

Final grades awarded. The final grade awarded is the primary outcome variable. It is used to calculate the course GPA for each population under study. Final grade data were recorded for each student in each course within the student information system. Grades entered included A, B, C, D, F, W, I, P, NP, CIP, CIPR, and Audit. The CIP and CIPR grades represent "course in progress" and were only used in particular disciplines. Only final grades of A through F were counted when calculating the Course GPA. Records with non A-F grades were not used in addressing research questions directly, but were included in the overall descriptive statistics.

Course GPA. The course GPA was calculated by converting each of the A-F grades into corresponding numerical values, such that A was equal to 4, B was equal to 3, C was equal to 2, D was equal to 1, and F was equal to 0. The Course GPA was then the mean of these numerical values for all students in the population under study when aggregated across all terms of study.

Student Disability Status Variables

Students with disability status (SWD). For the purposes of this study, students were part of the SWD population if, in a particular term of enrollment, they had an active student profile within the disability services accommodation management system.

Students with no disability status (No-Dis). For the purposes of this study, students are identified as No-Dis if there was no connection with the Disability Services office in any of the terms under study.

Students with potential disability status (Pre-SWD). This designation was used to identify students who were registered in courses in a term in which they did not have

disability status, but who either had a DS application in progress, or who established eligibility in a subsequent term.

Students without accommodation (SWD-N). Students who were eligible for accommodation but did not notify the faculty member, were presumed to have not had accommodation in place, though it is possible that some of these students could have disclosed to faculty informally, and it is also possible these students were using other supports from Disability Services aside from formal faculty notification, such as technology training, equipment loans, disability counseling, academic coaching, and support navigating college processes.

Students with accommodation (SWD-Y). Students who elected to notify their instructors of the accommodation they were eligible for, were presumed to have had accommodation in place, though it is possible that some of these students could have been unsure of how to benefit fully from the auxiliary aids and services provided, and/or they could have been working with instructors who did not implement accommodation faithfully, or who exhibited bias that countered the benefits, or simply did not use the accommodation even though it was available.

Student Demographic Variables

The demographic data used in this study included Cum GPA, gender and race/ethnicity.

Cum GPA. The cumulative GPA was a scale variable with values that ranged from 0 to 4. It was updated at the conclusion of each term in which final grades were awarded. The Cum GPA was recoded into a categorical variable with two groups, one for Cum GPA < 3, and one for Cum GPA ≥ 3.

Gender. The system data included the categories of female, male, and other (which included unlisted, unknown, and other).

Race/Ethnicity. The system data included the following categories: Asian, Black, Hispanic, Multiple, Native, Nonresident, Pacific Islander, White and Not Available (which included unreported as well as missing).

Institutional Variables

Institutional practice relies upon accommodation being implemented consistently, however research suggests characteristics of college employees, such as their attitudes, age, gender, and professional development experiences do impact the accommodation implementation process (Basilice, 2015; Holloway, 2010; Lombardi et al., 2013; Vogel, et al., 1999). While this study did not take employee variables into account, the data were pulled in a manner that ensured only records for students enrolled in the same courses as students with disabilities were being used, thus students had the same instructors, and were impacted by the same course related features. Course data were pulled from across many terms to ensure sufficiently large n to allow for disaggregation.

Subject/Pathway. During the terms under study, the college did not have a Guided Pathways approach in place. Because the college moved in this direction shortly after data collection, the subjects were grouped into their respective pathways during analysis to improve relevance of institutional specific findings and implications. There were 114 subjects represented in the data used for this study. There were 6 pathways defined at the college, as well as Academic Foundations which included Math. Because Math represented such a large percentage of all records it was isolated as an 8th group. There were also a small number of courses that were not able to be mapped directly to

any of the pathways. Physical Education (PE) was mapped to this category along with

courses that were no longer being offered. Course in this "other" category were included

for descriptive statistics, but excluded in answering the research questions.

The 8 groupings used for addressing the research questions were:

- Academic Foundations

- Art & Communication

- Business & Entrepreneurship

- Construction & Manufacturing

- Healthcare & Emergency

- Public Service & Education

- Science & Engineering

- Math

Course Number and Level. Each course was assigned a number between 0 and

299. The courses numbered between 0 and 99 were considered Pre-College, those

between 100 and 199 were considered 100 level, and those between 200 and 299 were

considered 200 level. Not all subjects were offered at all levels.

Course Delivery, Timing, and Location. Courses always had a location code,

but that code could correspond to a course being taught in-person at that physical

location, or a course being offered online by that campus. Locations could differ in terms

of available resources, focus of professional development activities, and other aspects of

campus culture. The online vs. in-person modality distinction was a focus of analysis,

while the campus site location and timing details were important for local context.

Students engaged in courses that met outside of standard business hours may have had reduced access to services that were typically funded to operate Monday through Friday 8am to 5pm. This could impact all students, but could disproportionately impact students who were eligible for accommodation. The process of implementing things like testing accommodations may have been more burdensome to implement in the absence of on-site support personnel, and thus may have been less likely to be implemented faithfully. The Evening/Weekend variable was created from a combination of data describing the date and time for on-site courses.

Data Cleaning

The export files that were provided were text delimited and csv files that were opened in Excel for inspection and quality control. During review of data files, a problem was identified in the export files from Institutional Effectiveness that had resulted in discrepant data for some of the demographic fields for a subset of the students. This error was corrected, and new export files were provided. Once the data had been thoroughly inspected to verify there were no further discrepant entries, the files were combined in Excel then brought into SPSS.

For the files exported from the student accommodation system, the "Get Data" option in Excel was used to bring all the txt files in from a single folder and load them into a single table. For the files exported by Institutional Effectiveness, the limitation in number of records allowed per Excel sheet required multiple imports. The Excel sheets from IE were each brought into SPSS as a dataset and combined there using the Merge Files by Adding Cases method. When bringing the data in, the default tolerance setting for "Percentage of values that determine data type" were adjusted from 95 to 99. The DS

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dataset was then combined with the IE dataset using the Merge Files by Adding Variables method. After all the data were combined in a single dataset, frequencies were run for each variable to identify any missing data.

- Grades. All records with missing grades were removed from the dataset.

- Race. None of the records missing race were removed.

- Gender. None of the records missing gender were removed.

- Subject. None of these records were missing. None of the other related institutional characteristic variables (delivery, CRN, etc.) were missing data. Further inspection revealed two data file errors that needed to be addressed:

- There were Pre-SWD records with disability type and accommodation eligibility. These were investigated, and it was possible to verify that in each case the proper designation needed to be manually adjusted and corrected to SWD.

- There were SWD records with no disability type or accommodation eligibility in place. These records did include disability status, course information, final grade awarded, and demographic information. They were retained and included or excluded as appropriate for the question being addressed. Questions focused on the relationship between disability status and final grade awarded could use these records, while questions focused on accommodation use could not.

With all the missing data accounted for, a final step in the data preparation process was to identify any duplication of records. At this point it became clear that the original export files provided by Institutional Effectiveness contained many duplicates. This is because there were sometimes more than one SWD in a particular course, but the

script that was used, pulled all the classmates into the dataset for each of them. When the duplicates were removed, the total number of records in the data set was reduced from almost two million records, 1,958,834, down to less than one million, 841,949. This represents a total headcount of 103,179 individuals.

There was overlap with many students attending courses before, during, and after the time they became eligible for accommodation. There were 2,539 students with records under both Pre-SWD status and SWD status, and a total unique headcount across both categories of 6,558 and 51,745 records. Those with SWD status also had overlap between the categories of SWD-N and SWD-Y.

Table 3.1

Headcount and Record Count by Accommodation Status

	No Disability	Pre-SWD	SWD-Y	SWD-N	Total
Head count	96,521	4,291	3,950	3,588	103,179
Record count	754,813	35,391	28,235	23,510	841,949

Data Coding

Once the data had been cleaned, and the records with missing data had been identified, and the duplicates had been removed, the data were recoded in SPSS to allow for exploration and analysis.

- Primary outcome variable data. Final Grade was recoded from a string variable into numeric data for the following categories: A, B, C, D, F, W, I, P, NP, Audit, and Other (which included course in progress grades used in some disciplines).

- Course GPA was created as a new variable for the A-F Grades with points assigned such that A=4, B-3. C=2, D=1, and F=0. The entries for W, I, Pass/No Pass, Audit and Other were excluded.

- Demographic data. Each demographic variable was recoded from a string variable into numeric data. Primary disability was recoded into the following groups: Developmental, Attention, Learning, Physical, Mental Health, Health, Sensory, and Other. Age was recoded into groups that align with institutional reporting categories: Under 18, 18-24, 25-29, 30-49, 50-64, and over 65. Gender included Male, Female, and Other. Ethnicity included Asian, Black, Hispanic, Multiple, Native, Nonresident, Pacific Islander, White and Not Available. Only Gender and Race/Ethnicity were used in the research question, with disability type and age included only in descriptive statistics.

- Cum GPA. The Cum GPA was recoded into two groups, one for students with a Cum GPA < 3.0 and the other for students with a Cum GPA ≥3.0

- Course data. Course level was created as a new variable to group all pre-college, 100 level, and 200 level courses based on their course number.

- Academic pathway was created as a new variable to group course subjects based on the institutional organizational structure, with Math pulled out from the Academic Foundations group due to the high number of registrations.

- Delivery mode, campus, and timing were each assigned numeric values. Only delivery mode was used in the research questions, but campus and timing were included in descriptive statistics.

Analysis Methods

A critical quantitative approach was used because there continues to be a need "to add to knowledge about the students…specifically those who were underrepresented and/or oppressed (Stage & Wells, 2014, p. 2)." The methods used existing data to augment what tends to be available through institutional effectiveness.

The approach focused on student outcomes and used disaggregation to identify patterns in how the differences in course GPA by disability status and accommodation use varied when examined by demographics, delivery, level, and academic pathway. The study focused on students who self-disclosed disability status and were connected formally to the Disability Services office, including those who did notify their instructors of their eligibility for accommodation (SWD-Y) and those who did not (SWD-N), as well as students who disclosed disability status in a future term (Pre-SWD). These students remained centered in the study, with the records of their classmates who had no known disability status (No-Dis) serving as context to understand how disability status and accommodation use related to final grades.

Because analysis was primarily focused on Course GPA, the records used in analysis were limited to those for students who remained registered for the whole term. Of the total 841,949 records, 729,934 were A-F grades. Future study could be directed to better understanding the patterns related to students who Withdraw, but there are interesting patterns in the distribution of final grades across disability and accommodation use status, that are observable even before analysis. As shown in Table 3.2, students with no known disability status are more likely to receive an A, and less likely to receive an F.

Table 3.2

Distribution of Final A-F Grades per Accommodation Status

	A	B	C	D	F
SWD-Y	43.7%	25.8%	15.3%	5.4%	9.8%
(23,472)	(10,262)	(6,051)	(3,581)	(1,271)	(2,307)
SWD-N	45.7%	23.8%	14.1%	5.0%	11.5%
(21,527)	(9,828)	(5,134)	(3,025)	(1,068)	(2,472)
Pe-SWD	44.7%	25.0%	14.3%	5.3%	10.7%
(27,306)	(12,216)	(6,839)	(3,895)	(1,439)	(2,917)
No-Dis	47.6%	25.2%	13.1%	4.5%	9.7%
(657,629)	(312,947)	(165,537)	(85,922)	(29,404)	(63,819)

Because final grades were not distributed normally, when testing for statistically significant differences in course GPA across disability status, non-parametric tests were used. Prior to running those tests, however, the data were explored through use of tree classification and descriptive statistics.

Tree Classification

To map out the relative importance of variables, SPSS was used to classify using the tree function. The Course GPA was identified as the dependent variable and the independent variables included accommodation status and disability type, academic pathway and course level, delivery, timing, and campus, race/ethnicity, gender, age group, and Cum GPA group.

The tree classification process was run twice, once using the CRT method that uses binary splits to produce a narrower tree, and once using the CHAID method which produces a wider tree, with multiple splits per level. The process was run using the

Course GPA as the dependent variable, which is a continuous variable. The independent variables were all categorical.

Using the CHAID method, which stands for Chi-Squared Automatic Interaction Detection, because the dependent variable is continuous, the algorithm used the F-Test to determine the best splits, and because there are multiple comparisons being made, the Bonferroni correction was applied. The process relied on identifying statistically significant differences and either splitting or merging, then continuing. The result was a depiction of the most impactful variable closest to the root, with successive branches continuing until no further splits could be performed. Using the CHAID method, the tree remained fairly shallow. The first split occurred based on Cum GPA group:

- When the Cum GPA was less than 3.0, the next split was for level

    o For Pre-College, the next split was pathway

    o For 100 level, the next split was delivery

    o For 200 level, the next split was for pathway

- When the Cum GPA was at or above 3.0, the next split was for pathway, and from there, the next splits were for age group, race, timing, or delivery

Using the CRT method, because each level split into two, the tree was deeper, but the first split again occurred based on Cum GPA group:

- When the Cum GPA was less than 3.0, the next split was for Pathway

    o For Math, the next split was for timing, then for race, then for race again

    o For all other pathways, the next split was a further division by pathway, followed by splits for delivery, then for pathway or level

- When the Cum GPA was at or above 3.0, the next split was for Pathway

    o Math and Science were grouped, then further split,

        ▪ Science was split by age, then race

        ▪ Math was split by race, then by race again

    o All other pathways were grouped, then further split by pathway

        ▪ Other (mainly PE), was split by timing

        ▪ All others were split by race, then by gender

Because the variable that was most impactful on Course GPA was confirmed to be Cum GPA, and this was true in both classification methods, the next step was to use descriptive statistics get a better sense of how the mean Course GPA varied by Cum GPA group when explored by student demographic and course characteristics. The descriptive statistics established a foundation for the pair-wise comparisons.

Descriptive Statistics

Since the first two research questions explored Course GPA with a focus on disability status, looking first at demographics, then at course delivery, and the third delved into accommodation use and academic pathway explorations while also accounting for Cum GPA, initial exploratory and descriptive work was needed to set the stage for the analysis that followed. In particular, since a tree classification process was used to confirm the relative importance of Cum GPA as a variable of interest, descriptive statistics detailing the relative percentages of records that fell into each of the two Cum GPA groups, along with the average Course GPA for each follow. These are organized by accommodation use status.

Table 3.3 details the breakdown of record counts, ratios of students in each Cum GPA group, and average Course GPA for each accommodation use status. For students in the SWD-N and Pre-SWD status, there was only a slightly larger percentage of students at or above a 3.0 Cum GPA, while for students in SWD-Y status, there was difference of 18 percentage points which is closer to the 24 point difference seen in the population of students with no known disability status.

Table 3.3

Course GPA by Accommodation Status per Cum GPA

Accommodation status	Cum GPA<3.0	Cum GPA≥3.0
SWD-Y	N = 9,700, 41%	13,772, 59%
n = 23,472, GPA = 2.88	Course GPA = 2.09	Course GPA = 3.44
SWD-N	10,483, 49%	11,044, 51%
n = 21,527, Course GPA = 2.87	Course GPA = 2.21	Course GPA = 3.51
Pre-SWD	12,497, 46%	14,809, 54%
n = 27,306, Course GPA = 2.88	Course GPA = 2.16	Course GPA = 3.49
No-Dis	251,708, 38%	405,921, 62%
n = 657,629, Course GPA = 2.96	Course GPA = 2.05	Course GPA = 3.53
Total	284,388, 39%	445,546, 61%
n = 729,934, GPA = 2.96	Course GPA = 2.06	Course GPA = 3.53

Disability Group

Even though diagnostic labels were not centered in this research, there are some basic descriptive statistics that were provided for context in Table 3.4. When looking specifically at primary disability type for SWD, the largest differences in percentage of students at or above a 3.0 vs. below were for students with hearing and mobility/dexterity limitations, which both had a much larger percentage of students in the higher Cum GPA group. The smallest differences were for students with attention, autism/developmental, learning, or mental health related disability, where the split between the low and high Cum GPA groups was more even. Except for students with Mobility/Dexterity limitations

or Other Health primary disability types, students who were eligible for accommodation

but did not notify faculty had a higher Course GPA than those who did notify instructors.

Table 3.4

Course GPA by Disability Group per Cum GPA

Disability Type	Cum GPA<3.0	Cum GPA≥3.0	Range
Attention	4,144, 50%	4,217, 50%	Low GPA (.31)
n = 8,361	SWD-Y = 2.03	SWD-Y = 3.41	High GPA (.13)
Course GPA = 2.85	SWD-N = 2.34	SWD-N = 3.54	
Autism/Developmental	1,671, 48%	1,835, 52%	Low GPA (.33)
n = 3,506	SWD-Y = 2.13	SWD-Y = 3.48	High GPA (.01)
Course GPA = 2.94	SWD-N = 2.47	SWD-N = 3.47	
Hearing	411, 35%	768, 65%	Low GPA (.55)
n = 1,179	SWD-Y = 2.22	SWD-Y = 3.58	High GPA (.03)
Course GPA = 3.18	SWD-N = 2.76	SWD-N = 3.61	
Learning	3,849, 47%	4,422, 53%	Low GPA (.21)
n = 8,271	SWD-Y = 2.08	SWD-Y = 3.42	High GPA (.05)
Course GPA = 2.86	SWD-N = 2.28	SWD-N = 3.48	
Mental Health	6,333, 45%	7,695, 55%	Low GPA (.05)
n = 14,028	SWD-Y = 2.06	SWD-Y = 3.44	High GPA (.08)
Course GPA = 2.85	SWD-N = 2.11	SWD-N = 3.51	
Mobility/Dexterity	731, 37%	1,220, 63%	Low GPA (.01)
n = 1,951	SWD-Y = 2.20	SWD-Y = 3.60	High GPA (.09)
Course GPA = 3.07	SWD-N = 2.19	SWD-N = 3.51	
Other Health	5,869, 43%	7,732, 57%	Low GPA (.07)
n = 13,601	SWD-Y = 2.12	SWD-Y = 3.42	High GPA (.08)
Course GPA = 2.86	SWD-N = 2.05	SWD-N = 3.50	
Vision	363, 43%	485, 57%	Low GPA (.12)
n = 848	SWD-Y = 2.30	SWD-Y = 3.48	High GPA (.04)
Course GPA = 3.00)	SWD-N = 2.42	SWD-N = 3.52	
Total	23,371, 45%	28,374, 55%	
n = 51,745			
Course GPA = 2.88			

Race/Ethnicity

The Mean Course GPA by race/ethnicity per accommodation status for Cum

GPA≥3.0 and Cum GPA<3.0 are provided in Table 3.5. The total number of records is

provided, as well as the number of records with an A-F grade). The range in GPA when

compared across accommodation status by race/ethnicity, was largest for Pacific Islander

students who had the lowest Course GPA when there was no disability status, and the

highest Course GPA when there was eligibility for accommodation but no notification, though it is important to confirm that Pacific Islanders are one of the smaller subpopulations with a smaller number of records within the dataset. Race was the only demographic area in which there were some groups with a larger percentage of records with Cum GPA less than 3.0, which was the case for students identified as Black and those identified as Pacific Islander. The greatest positive differences were for students identified as Nonresident, Asian, or White.

Table 3.5

Course GPA by Race/Ethnicity per Cum GPA

Race/Ethnicity	Cum GPA<3.0	Cum GPA≥3.0	Range
Asian n = 55,927 (49,676 A-F) 89%	19,773, 35% SWD-Y = 1.97 SWD-N = 2.40 Pre-SWD = 2.26 No-Dis = 2.22	36,154, 65% SWD-Y = 3.46 SWD-N =3.59 Pre-SWD = 3.56 No-Dis = 3.55	Low GPA (.43) High GPA (.13)
Black n = 46,613 (38,358 A-F) 82%	28,988, 62% SWD-Y = 1.94 SWD-N = 2.01 Pre-SWD = 2.11 No-Dis = 1.87	17,625, 38% SWD-Y = 3.32 SWD-N = 3.31 Pre-SWD = 3.37 No-Dis =3.38	Low GPA (.23) High GPA (.06)
Hispanic n = 92,733 (81,076) 87%	44,654, 48% SWD-Y = 2.20 SWD-N = 2.15 Pre-SWD = 2.19 No-Dis = 2.07	48,079, 52% SWD-Y = 3.39 SWD-N = 3.51 Pre-SWD = 3.44 No-Dis = 3.44	Low GPA (.14) High GPA (.11)
Multiple n = 56,759 (48,903 A-F) 86%	26,408, 47% SWD-Y = 2.03 SWD-N = 2.20 Pre-SWD = 2.19 No-Dis = 2.01	30,351, 53% SWD-Y = 3.42 SWD-N =3.52 Pre-SWD = 3.48 No-Dis = 3.51	Low GPA (.21) High GPA (.10)
Native n = 8,254 (6,914 A-F) 84%	3,861, 47% SWD-Y = 1.89 SWD-N = 2.24 Pre-SWD = 2.15 No-Dis = 1.93	4,393, 53% SWD-Y = 3.33 SWD-N = 3.46 Pre-SWD = 3.22 No-Dis = 3.41	Low GPA (.35) High GPA (.23)
Nonresident n = 23,366 (21,297 A-F) 91%	7,417, 32% SWD-Y = 1.93 SWD-N = 2.12 Pre-SWD = 2.34 No-Dis = 2.11	15,949, 68% SWD-Y = 3.45 SWD-N = 3.47 Pre-SWD = 3.50 No-Dis = 3.55	Low GPA (.42) High GPA (.10)

Race/Ethnicity	Cum GPA<3.0	Cum GPA≥3.0	Range
Pacific Islander n = 5,196 4,491 A-F) 86%	2,734, 53% SWD-Y = 2.31 SWD-N = 3.06 Pre-SWD = 2.19 No-Dis = 1.87	2,462, 47% SWD-Y = 3.25 SWD-N =3.36 Pre-SWD = 3.41 No-Dis = 3.42	Low GPA (1.19) High GPA (.17)
White n = 497,080 (430,622 A-F) 87%	187,206, 38% SWD-Y = 2.11 SWD-N = 2.23 Pre-SWD = 2.14 No-Dis = 2.06	309,874, 62% SWD-Y = 3.46 SWD-N = 3.50 Pre-SWD = 3.51 No-Dis = 3.56	Low GPA (.17) High GPA (.09)
Unknown n = 56,021 (48,597 A-F) 87%	22,078, 39% SWD-Y = 2.12 SWD-N = 2.18 Pre-SWD = 2.19 No-Dis = 2.04	33,943, 61% SWD-Y = 3.41 SWD-N = 3.57 Pre-SWD = 3.48 No-Dis = 3.54	Low GPA (.15) High GPA (.17)

Gender

When looking at gender, the gap was much larger for female vs. male students. Students with "other" gender identity were closer to females than males. To visualize the differences in Mean Course GPA by gender per accommodation status for Cum GPA≥3.0 and Cum GPA<3.0, see Table 3.6.

Table 3.6

Course GPA by Gender per Cum GPA

Gender	Cum GPA<3.0	Cum GPA≥3.0	Range
Female n = 448,923 (385,516 A-F) 86%	164,932, 37% SWD-Y = 2.11 SWD-N = 2.20 Pre-SWD = 2.22 No-Dis = 2.07	284,531, 63% SWD-Y = 3.45 SWD-N = 3.52 Pre-SWD = 3.50 No-Dis = 3.56	Low GPA (.15) High GPA (.11)
Male n = 374,745 (328,308 A-F) 88%	171,651, 46% SWD-Y = 2.05 SWD-N = 2.21 Pre-SWD = 2.09 No-Dis = 2.03	203,094, 54% SWD-Y = 3.43 SWD-N = 3.49 Pre-SWD = 3.46 No-Dis = 3.50	Low GPA (.17) High GPA (.07)
Other n = 18,281 (16,110 A-F) 88%	7,076, 39% SWD-Y = 2.23 SWD-N = 2.15 Pre-SWD = 1.87 No-Dis = 1.98	11,205, 61% SWD-Y = 3.45 SWD-N = 3.52 Pre-SWD = 3.50 No-Dis = 3.58	Low GPA (.36) High GPA (.13)

For both female and male students, when the GPA was below 3.0, having disability status, whether accommodation was used or not, was correlated with a higher Course GPA, while for those with a Cum GPA at or above 3.0, the situation reversed, and those without disability status had the highest Course GPA. For the students with other or unknown gender, those with a lower Cum GPA had the lowest Course GPA when they were in a Pre-SWD status, and significantly higher Course GPA if the disability status was confirmed, with the highest average for those who notify their instructors of their accommodation eligibility.

Delivery

While modality (on-site vs. online) was the most critical piece analyzed for delivery, the differences based on timing were also explored through descriptive statistics. Table 3.7 provides details for both modality and timing. For modality, in both on-site and online courses, when the Cum GPA was under 3.0, the mean Course GPA was the same or higher for students with disabilities or pre-disability status when compared to students without disabilities, and for online courses in particular, when students who were eligible for accommodation used it, the average Course GPA was higher than for any other group. However, when the Cum GPA was 3.0 or above, in both delivery methods, students without any known disability status had the highest Course GPA. One of the interesting patterns when looking at course GPA differences based on timing was that for both evening and weekend courses, the average Course GPA for students with either current or future disability status, whether accommodation was used or not, was higher than the average Course GPA for students with no known disability

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status. Also interesting was that the ratio of records with A-F grades assigned was lower

for weekend courses, indicating a higher percentage of Withdrawals, Audits, and P/NP

grades. This is a pattern that would be interesting to look into more fully. Especially if a

more qualitative approach were used to determine which factors were most salient.

Table 3.7

Course GPA by Delivery Mode per Cum GPA

Delivery Mode	Cum GPA<3.0	Cum GPA≥3.0	Range
On-Site n=634,940 (553,363 A-F) 87%	SWD-Y = 2.12 SWD-N = 2.29 Pre-SWD = 2.22 No-Dis = 2.12	SWD-Y = 3.43 SWD-N = 3.53 Pre-SWD = 3.49 No-Dis = 3.53	Low GPA (.17) High GPA (.10)
Online n=207,009 (176,571 A-F) 85%	SWD-Y = 1.94 SWD-N = 1.82 Pre-SWD = 1.89 No-Dis =1.84	SWD-Y = 3.48 SWD-N = 3.41 Pre-SWD = 3.46 No-Dis = 3.54	Low GPA (.13) High GPA (.13)
Day n=483,799 (425,406 A-F) 88%	SWD-Y = 2.07 SWD-N =2.26 Pre-SWD = 2.20 No-Dis = 2.10	SWD-Y = 3.43 SWD-N =3.52 Pre-SWD = 3.49 No-Dis =3.52	Low GPA (.19) High GPA (.09)
Evening n=118,688 (104,257 A-F) 88%	SWD-Y = 2.24 SWD-N =2.37 Pre-SWD = 2.28 No-Dis =2.17	SWD-Y = 3.43 SWD-N =3.54 Pre-SWD = 3.49 No-Dis =3.54	Low GPA (.20) High GPA (.11)
Multiple Meeting Times n=220,223 (183,981 A-F) 84%	SWD-Y = 1.97 SWD-N =1.85 Pre-SWD = 1.91 No-Dis =1.85	SWD-Y = 3.48 SWD-N =3.44 Pre-SWD = 3.47 No-Dis =3.54	Low GPA (.12) High GPA (.10)
Weekend n=19,239 (14,360 A-F) 75%	SWD-Y = 2.45 SWD-N =2.54 Pre-SWD = 2.47 No-Dis =2.14	SWD-Y = 3.57 SWD-N =3.61 Pre-SWD = 3.59 No-Dis =3.57	Low GPA (.40) High GPA (.04)

Level

Table 3.8 details exploration of Course GPA by accommodation status when

records were sorted by academic level. There was more variation in mean Course GPA

across accommodation status categories for students who had a lower Cum GPA, and this

was especially true for the Pre-College and 100 level course courses. Also, for students in

the lower Cum GPA group, the average Course GPA was higher for those with future or current disability status, while for those in the higher Cum GPA group, it was students with no known disability status who tend to have the highest Course GPA.

Table 3.8

Course GPA by Level per Cum GPA

Level	Cum GPA<3.0	Cum GPA≥3.0	Range
Pre-College n=88,869 (72,726 A-F) 82%	SWD-Y = 1.69 SWD-N = 1.53 Pre-SWD = 1.71 No-Dis = 1.55	SWD-Y = 3.18 SWD-N = 3.22 Pre-SWD = 3.25 No-Dis = 3.27	Low GPA (.18) High GPA (.09)
100 n=449,465 (388,966 A-F) 87%	SWD-Y = 2.19 SWD-N = 2.32 Pre-SWD = 2.25 No-Dis =2.14	SWD-Y = 3.50 SWD-N = 3.53 Pre-SWD = 3.55 No-Dis = 3.57	Low GPA (.18) High GPA (.07)
200 n=303,615 (268,212 A-F) 88%	SWD-Y = 2.10 SWD-N = 2.22 Pre-SWD = 2.21 No-Dis =2.11	SWD-Y = 3.43 SWD-N = 3.50 Pre-SWD = 3.46 No-Dis = 3.53	Low GPA (.12) High GPA (.10)

Academic Pathway

The exploration of mean Course GPA by pathway see is highlighted in Table 3.9.

- When looking by pathway per accommodation status for those with a Cum GPA less than 3.0, the highest average Course GPA was never the nondisabled group, it was most often the students with disabilities who were eligible for accommodation but did not notify their instructors, though there were also pathways where the highest course GPA was either those who used accommodation or those who were in the Pre-SWD status.

- When looking by pathway per accommodation status for those with a Cum GPA of 3.0 or greater, the highest course GPA tended to be for the students with no

disability, though there were also some pathways where it was the students in the

Pre-SWD status who had the highest course GPA.

- The percentage of students with eligibility who choose to disclose tends to be

higher for the higher Cum GPA group, and is highest for Math.

Table 3.9

Course GPA by Pathway per Cum GPA

Pathway	Cum GPA<3.0	Cum GPA≥3.0	GPA Range	% SWD Notify
Academic Foundations n=134,269 (117,021 A-F) 87% GPA=2.85	SWD-Y = 2.12 SWD-N = 2.10 Pre-SWD = 2.16 No-Dis = 2.01	SWD-Y = 3.57 SWD-N = 3.57 Pre-SWD = 3.60 No-Dis = 3.58	Low GPA (.15) High GPA (.03)	Low GPA 57% High GPA 63%
Art & Com. n=133,094 (114,923 A-F) 86% GPA=3.18	SWD-Y = 2.30 SWD-N = 2.43 Pre-SWD = 2.45 No-Dis = 2.32	SWD-Y = 3.60 SWD-N = 3.58 Pre-SWD = 3.61 No-Dis = 3.58	Low GPA (.14) High GPA (.03)	Low GPA 46% High GPA 50%
Business & Entrepreneur. n=49,633 (44,962 A-F) 91% GPA=2.92	SWD-Y = 2.14 SWD-N = 1.97 Pre-SWD = 1.99 No-Dis = 2.02	SWD-Y = 3.43 SWD-N = 3.43 Pre-SWD = 3.41 No-Dis = 3.58	Low GPA (.17) High GPA (.17)	Low GPA 48% High GPA 55%
Const. & Manufacturing n=27,202 (25,321 A-F) 93% GPA=3.16	SWD-Y = 2.15 SWD-N = 2.41 Pre-SWD = 2.31 No-Dis = 2.39	SWD-Y = 3.54 SWD-N = 3.55 Pre-SWD = 3.66 No-Dis = 3.58	Low GPA (.26) High GPA (.12)	Low GPA 40% High GPA 43%
Healthcare & Emergency n=35,290 (31,039 A-F) 88% GPA=3.34	SWD-Y =2.31 SWD-N = 2.46 Pre-SWD = 2.43 No-Dis = 2.39	SWD-Y = 3.42 SWD-N = 3.49 Pre-SWD = 3.49 No-Dis = 3.58	Low GPA (.15) High GPA (.16)	Low GPA 48% High GPA 63%
Public Ser. & Education n=158,110 (140,306 A-F) 89% GPA=3.04	SWD-Y = 2.31 SWD-N = 2.26 Pre-SWD = 2.30 No-Dis =2.16	SWD-Y = 3.54 SWD-N = 3.55 Pre-SWD = 3.60 No-Dis = 3.58	Low GPA (.15) High GPA (.05)	Low GPA 51% High GPA 57%
Science & Engineering n=145,184 (124,058 A-F) 85% GPA=2.93	SWD-Y = 1.96 SWD-N = 1.99 Pre-SWD = 1.96 No-Dis = 1.92	SWD-Y = 3.32 SWD-N = 3.39 Pre-SWD = 3.33 No-Dis = 3.58	Low GPA (.07) High GPA (.26)	Low GPA 55% High GPA 62%
Math n=118,861 (99,795 A-F) 84% GPA=2.44	SWD-Y = 1.49 SWD-N = 1.38 Pre-SWD = 1.53 No-Dis =1.50	SWD-Y = 3.03 SWD-N = 3.00 Pre-SWD = 3.09 No-Dis = 3.58	Low GPA (.14) High GPA (.58)	Low GPA 62% High GPA 72%
Other n=40,306 (32,509 A-F) 81% GPA=3.41	SWD-Y = 2.89 SWD-N = 3.11 Pre-SWD = 2.95 No-Dis = 2.90	SWD-Y = 3.64 SWD-N = 3.77 Pre-SWD = 3.74 No-Dis = 3.76	Low GPA (.22) High GPA (.13)	Low GPA 29% High GPA 31%

Methodology Summary

This research was rooted in a theoretical framework that placed students with disabilities at the center and acknowledged that individual accommodation is an insufficient institutional response to ensuring equity for disabled students. The exploratory ex post facto design sought to explore data that is seldom accessed or interrogated in postsecondary practice. The goal was to use data that should readily be available to institutions in daily work, and use it in ways that were approachable, and replicable, in the hopes of spurring conversation and ideas for further inquiry.

The study focused on A-F grades assigned to students attending a large urban Community College between Fall 2014 and Summer 2018. The student demographic and course detail related information were gathered for all courses in which there was at least one student with a connection to the Disability Services office. The A-F grades were used to calculate mean Course GPA. The exploration by demographic and course detail groupings set the stage for analysis aimed at confirming where there were statistically significant differences.

Chapter Four: Analysis and Findings

This research focused on the academic outcomes of students who were connected formally to the disability services office in a large urban community college. Institutional data was requested for the courses these students were registered for between Fall 2014 and Summer 2018, as well as the final grades assigned for each of them, and for each of their classmates. The student demographic information as well as the discipline and course delivery information for each of the courses was brought into a statistical analysis software system. Prior to analysis, a classification tree was used to confirm that cumulative GPA was the most significant factor in predicting the final grade. During analysis, comparisons of average Course GPA were run across disability and accommodation status by demographic and course variables.

A critical quantitative approach was selected because there continues to be a need "to add to knowledge about the students…specifically those who were underrepresented and/or oppressed (Stage & Wells, 2014, p. 2)." One of the unique features of the study was the identification of students who disclosed disability status in a future term, thereby allowing comparisons of final grades awarded to students who were in a Pre-Disability (Pre-SWD) status to students who had formally disclosed (SWD) and in a more specific view, to those had disclosed and did notify their instructors of accommodation eligibility (SWD-Y) vs. those were eligible but did not notify their instructors (SWD-N).

With disability status at the center, this study used existing data to explore and illuminate patterns in the distributions of final grades for college students with and without disability status, who were and were not using accommodation. These students were attending courses at an urban community college, earning credit in a variety of

subject areas. They represent a variety of identities in terms of age, gender, race, and ethnicity. Quantitative studies like this one, serve as a complement to qualitative approaches that allow personal narratives to paint a picture of lived experience. This research focused on student outcomes for students who completed the term in a registered status, and were awarded a final grade. Records were aggregated across a number of terms to amass a large enough number of records to identify relationships between disability status, accommodation use, cumulative GPA, race, gender, subject, level, and mode of delivery.

The Research Questions

At the broadest level of inquiry, the first question asked if there were statistically significant differences in the mean Course GPA for students who have confirmed disability status (SWD), versus those who have pre-SWD status, versus those with known disabilities status (No-Dis).

The Course GPA and number of records for each disability status group were:

- SWD (mean Course GPA 2.88, n=44,999)

- Pre-SWD (mean Course GPA 2.88, n=27,306)

- No-Dis (mean Course GPA 2.97, n=657,629)

While the first question began broad, it had two sub-parts, focused on demographics. Knowing that both gender and race/ethnicity have often been factors related to differences in grade distributions, these research questions were approached by first grouping student records based on those demographic characteristics, then looking for additional statistically significant differences when comparing across disability status:

- RQ1a: Are there statistically significant differences in the mean Course GPA, when records are grouped by gender then compared across disability status?

- RQ1b: Are there statistically significant differences in the mean Course GPA, when records are grouped by race then compared across disability status?

The second question shifted the focus from individual demographics to aspects of course delivery. Given the extensive literature that demonstrates differences in grade distributions based on delivery mode (online vs. in-person) including some findings in which students with disabilities fare better in online courses (Stewart et al., 2010), this research question was addressed by first grouping student records based on method of delivery, then running comparisons by disability status to see if additional differences in grade distributions are statistically significant. RQ2: Are there statistically significant differences in the mean Course GPA, when records are grouped by delivery method then compared across disability status?

The third question moved from comparisons based on disability status, into the complexity of accommodation use in the context of different disciplines, and with past academic performance taken into account. Thus, prior to analysis, records were first grouped by Cum GPA with exploration of demographics. This set the stage for analysis, wherein records were grouped by Academic Pathway, with pairwise comparisons across disability accommodation status. RQ3: Are there statistically significant differences in the mean Course GPA when records are grouped by Cum GPA, then further grouped by Academic Pathway, before being compared across accommodation status?

By interrogating the data and organizing the analysis with a focus on academic pathways, the patterns gleaned had a potential to be useful to academic leaders who are positioned to influence priorities and parameters to shift practice toward greater equity.

Running the Analyses

To address the research questions, tests were run to identify statistically significant differences in Course GPA on the basis of disability or accommodation status. Because final grades were not distributed normally, when testing for statistically significant differences in Course GPA, non-parametric tests were used. The Independent-Samples Kruskal-Wallis Test was used to compare Course GPA means, and to account for the large number of comparisons, the Bonferroni correction was used to address the increased risk of a type 1 error. In each case, analysis continued after confirming the following assumptions were met:

- Dependent variable must be either ordinal or continuous. In this case, the final grades were converted to grade points (continuous).

- The independent variable has three or more categorical, independent groups.

- The observations are independent of one another, meaning the records are in only one group or another for any given observation.

- The distributions have the same shape.

Research Question 1

Are there statistically significant differences in the average Course GPA, when records are grouped by demographic characteristics then compared across disability status? An initial comparison confirmed the average Course GPA for students with no

known disability status was significantly different from the distributions of course GPA

for students with confirmed (SWD) or future (Pre-SWD) disability status. The results of

the pairwise comparisons are shown in Table 4.1.

Table. 4.1

Pairwise Comparisons of Course GPA by Disability Status

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig^a
SWD-PreSWD	-517.739	1511.944	-.342	.732	1.000
SWD-No-Dis	-13882.062	960.402	-14.454	.000	.000
PreSWD-No-Dis	-13364.323	1217.271	-10.979	.000	.000

Each row tests the null hypothesis the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is .050.

RQ1a: Gender. Are there statistically significant differences in the mean Course

GPA when records are grouped by gender and compared across disability status? Table

4.2 provides course GPAs, along with the percentages of records. Following the table are

observations, then the results of the pair-wise comparisons used to determine if the

differences in distributions are statistically significant.

Table. 4.2

Course GPA by Gender and Disability Status

	SWD GPA	SWD %	SWD N	Pre-SWD GPA	Pre-SWD %	Pre-SWD N	No-Dis GPA	No-Dis %	No-Dis N
Total	2.88	100%	44,999	2.88	100%	27,306	2.96	100%	657,629
Female	2.94	53.60%	24,110	2.95	58.90%	16,093	3.05	52.50%	345,313
Male	2.80	44.10%	19,829	2.77	38.60%	10,549	2.86	45.30%	297,930
Other	2.85	2.40%	1,060	2.88	2.40%	664	3.01	2.20%	14,386

The exploration of grades showed female students tended to have a higher course GPA than male students. This was consistent with other findings (Chee, et al., 2005; Tessema, et al. 2012) and when looking at the literature related to gender in the context of disability status, there have been studies pointing to significant differences along gender for completion, indicating for example, that the odds of a female student graduating were 1.5 times higher than a male student with identical characteristics and disability services (Pingry O'Neil et al, 2012), however other studies found gender to not be a significant factor in the number of credits or cumulative GPA (Safer et al., 2020).

To evaluate if the distributions were significantly different, pairwise comparisons of disability status were run after first splitting the cases by gender status. Kruskal-Wallis tests were run for each Gender under study. Appendix A contains the SPSS output for the pairwise comparisons of disability status when split by gender. In each case there were statistically significant differences between students with No-Dis status and students with SWD status. The differences between students Pre-SWD and No-Dis were significant for both male and female students, but not for students with unknown gender. There were no statistically significant differences between Pre-SWD status and SWD status in any of the gender groups.

RQ1b Race/Ethnicity. The data used in this study came from a predominantly White institution, in a predominantly White state. The equity gaps that exist on the basis of race were already well established, however, teasing apart what those gaps look like when disability status is factored in provided a more nuanced look. RQ1b: Race/Ethnicity. Are there statistically significant differences in the Course GPA when records are grouped by race/ethnicity and compared across disability status?

Table 4.3 shows the average GPA by Race/Ethnicity as well as the specific average by disability status. The general pattern for the records shows the highest average GPA is for those with no known disability status, however, this pattern did not hold steady when the records were examined by race. Because this is a predominantly White institution, the number of records for students who are White outnumber all other categories. In the absence of racially disaggregated data analysis, it would be easy for the patterns that are true for them, to be misunderstood as the patterns for all.

Table. 4.3

Course GPA by Race/Ethnicity and Disability Status

	SWD GPA	SWD %	SWD N	Pre-SWD GPA	Pre-SWD %	Pre-SWD N	No-Dis GPA	No-Dis %	No-Dis N
Total	2.88	100%	44,999	2.88	100%	27,306	2.96	100%	657,629
Asian 3.10	2.87	4%	1,633	3.02	4%	1,001	3.11	7%	47,042
Black 2.48	2.42	6%	2,895	2.67	7%	1,935	2.47	5%	33,528
Hispanic 2.80	2.83	9%	4,169	2.79	10%	2,704	2.80	11%	74,203
Multiple 2.84	2.88	8%	3,411	2.92	9%	2,432	2.83	7%	43,060
Native 2.76	2.77	1%	540	2.55	1%	229	2.77	1%	6,145
Nonresident 3.11	2.77	1%	307	3.07	2%	402	3.12	3%	20,588
Pacific Islander 2.63	3.04	0%	137	2.89	0%	101	2.61	1%	4,253
White 3.02	2.93	64%	28,894	2.90	62%	16,894	3.03	59%	384,834
Unknown 3.0	2.89	7%	3,013	2.93	6%	1,608	3.00	7%	43,976

To highlight the differences in course GPA by race/ethnicity, and make them easier to see, two graphs are offered. Figure 4.1 shows the gaps between the total and the disability status per race/ethnicity, while Figure 4.2 shows the gaps between the total and the disability status per disability status. Following these graphics are the results of the pair-wise comparisons.

Figure 4.1

Course GPA Gaps for Disability Status per Race/Ethnicity

	Asian	Black	Hispanic	Multiple	Native	Non-resident	Pacific Islander	White
■ SWD	-0.23	-0.05	0.02	0.04	0.01	-0.34	0.41	-0.09
▨ PreSWD	-0.08	0.19	-0.02	0.08	-0.21	-0.04	0.26	-0.12
■ NoDis	0.01	-0.01	0.00	-0.01	0.01	0.01	-0.02	0.01
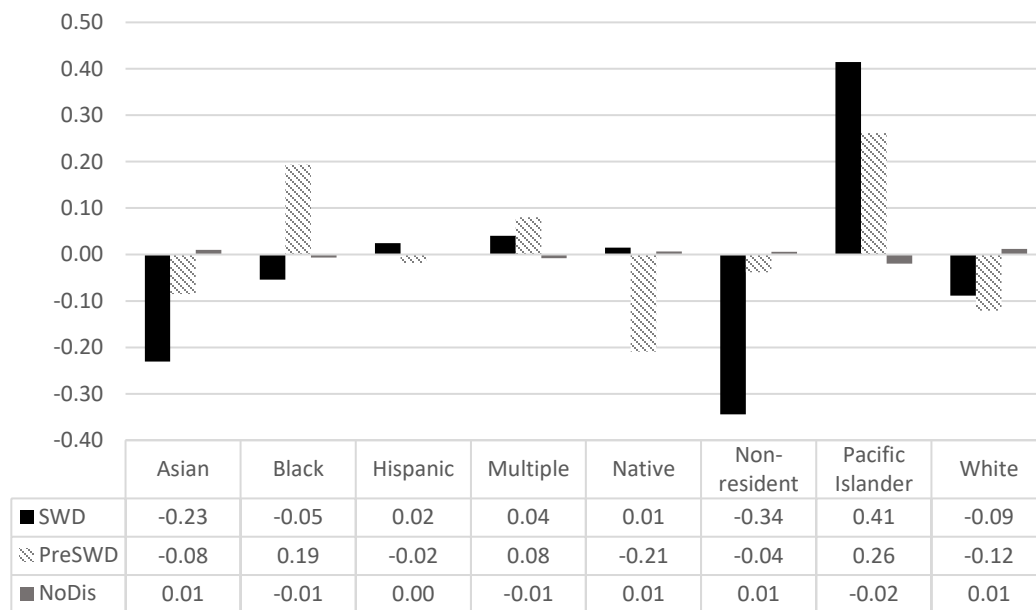
Disability inequity varied across racial identity groups. For some groups, such as those identifying as Hispanic, the Course GPA was very similar across disability groups, however for students who identified as Asian, Black, Native, Non-Resident, or Pacific Islander, the differences between disability groups were larger – though not consistent in terms of magnitude or direction. For students who identified with Multiple racial identities, and for students who identified as White, the differences were more moderate.

Some populations had larger differences across disability status, and there was variation in whether disability status was tied to higher or lower GPA. For example:

- Students who identified as White, Asian, or Non-resident, had the highest average course GPA when there was no known disability.

- Students in No-Dis status did not have the highest average course GPA when students identified as Black, Hispanic, Multiple, or Pacific Islander.

- For students who identified as Black or Pacific Islander, the highest average Course GPA was for the Pre-SWD status.

- Students who identified as Native had the lowest course GPA when in a Pre-SWD status.

Figure 4.2

Course GPA Gaps for Race/Ethnicity per Disability Status

	Asian	Black	Hispanic	Multiple	Native	Non-resident	Pacific Islander	White
■ SWD	-0.01	-0.45	-0.05	0.01	-0.10	-0.11	0.17	0.05
▨ PreSWD	0.14	-0.21	-0.09	0.04	-0.33	0.19	0.01	0.02
■ NoDis	0.14	-0.49	-0.16	-0.13	-0.20	0.15	-0.35	0.07
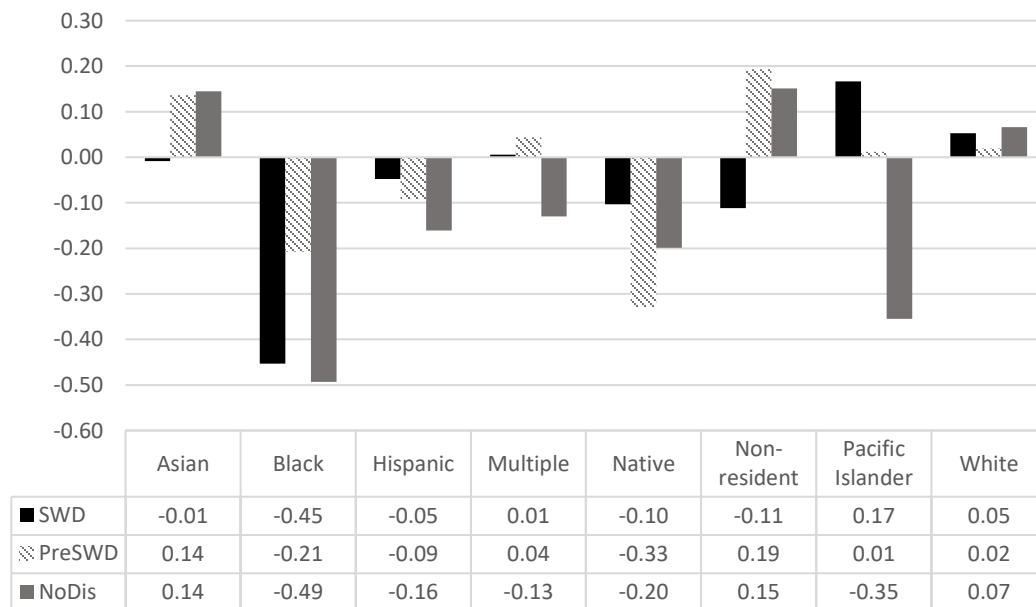
Racial inequity persisted across disability status groups. The records come from a predominantly White institution, in a predominantly White state, and the findings from this study confirmed the larger patterns that were known to exist. There were clear equity gaps on the basis of race.

- For White students, and students without known race/ethnicity status, the Course GPA was higher than the total for all disability status categories.

- For Black, Hispanic, and Native students, the Course GPA was lower than the total for all disability status categories.

- For Asian and nonresident students, the Course GPA was higher than the total for both the students with No Dis status and Pre-SWD status, however for SWD it was lower.

- For students who identified as Pacific Islander or with Multiple race/ethnicity, the Course GPA was lower for No Dis status, but higher for students with Pre-SWD or SWD status.

Moving from the descriptive statistics around race/ethnicity and disability status to the evaluation of whether the distributions of final grades awarded were significantly different, pairwise comparisons of disability status were run after first splitting the cases by race/ethnicity. Kruskal-Wallis tests were run for each race/ethnicity under study.

Appendix A contains the SPSS output for the pairwise comparisons of disability status when split by race/ethnicity. The results are summarized in Table 4.4, and confirmed statistically significant differences between the Course GPA distributions in all race/ethnicities, with the exception of students who identified as Hispanic, but where

those differences were significant varied by race/ethnicity. In some groups there were

significant differences between students with a current vs a future disability status, while

for other groups, the Course GPAs were not significantly different.

Table. 4.4

Pairwise Comparisons by Race per Disability Status

Race/Ethnicity	SWD – PreSWD	SWD - No Dis	PreSWD - No Dis
Asian	Significant	Significant	Not Significant
Black	Significant	Not Significant	Significant
Hispanic	Not Significant	Not Significant	Not Significant
Multiple	Not Significant	Not Significant	Significant
Native	Significant	Not Significant	Significant
Nonresident	Not Significant	Significant	Not Significant
Pacific Islander	Not Significant	Significant	Not Significant
White	Not Significant	Significant	Significant
Not Available	Not Significant	Significant	Not Significant

RQ2 Course Delivery

RQ2: Course Delivery. Are there statistically significant differences in the Course

GPA, when records are grouped by delivery method and compared across disability

status? To address this research question, the first step was to look at descriptive

statistics, the GPAs themselves, as well as the percentages of records within each

delivery method. This information, detailed in Table 4.5 shows that students with

confirmed (SWD) or suspected (Pre-SWD) disability who remained enrolled for the

entire term had an average Course GPA that was more similar to each other than to the

Course GPA for students with no known disability status. Also, students with no known

72

disability status had higher average course GPAs than their peers with current or future disability status, with the largest difference occurring in online courses.

Table. 4.5

Course GPA by Delivery Method and Disability Status

Modality	SWD GPA (n=44,999)	Pre-SWD GPA (n=27,306)	No Dis GPA (n=657,629)
Total	2.88	2.88	2.96
On-Site	2.89	2.91	2.99
Online	2.81	2.76	2.90
Day	2.86	2.90	2.97
Eve	2.96	2.92	3.04
Mult	2.84	2.78	2.91
Wknd	3.05	3.06	3.01

To evaluate if the distributions were significantly different, pairwise comparisons of disability status were run after first splitting the cases by delivery mode. The output of the Kruskal-Wallis tests from SPSS is included in Appendix A. The results confirmed statistically significant differences between the average Course GPA of No-Dis and Pre-SWD or SWD in both on-site and online courses, but no significant difference between Pre-SWD and SWD in either delivery method. The situation was mostly similar when looking at the timing element of course delivery. There were statistically significant differences between the average course GPA for students with no known disability status when compared to those with current or future disability status, and no statistically significant differences between those with current vs future status. This pattern was true when looking at daytime courses, evening courses, and for courses that have multiple

meeting times. However, for courses that were delivered over the weekend, the pattern was different, and there were no statistically significant differences across disability status.

RQ3 – Cumulative GPA, Accommodation, and Pathway

To explore the ways in which Course GPA varied by accommodation status per pathway, an initial step was to examine the differences based on disability status. Figure 4.3 depicts the mean Course GPA for each pathway by disability status.

Figure. 4.3

Course GPA by Pathway and Disability Status
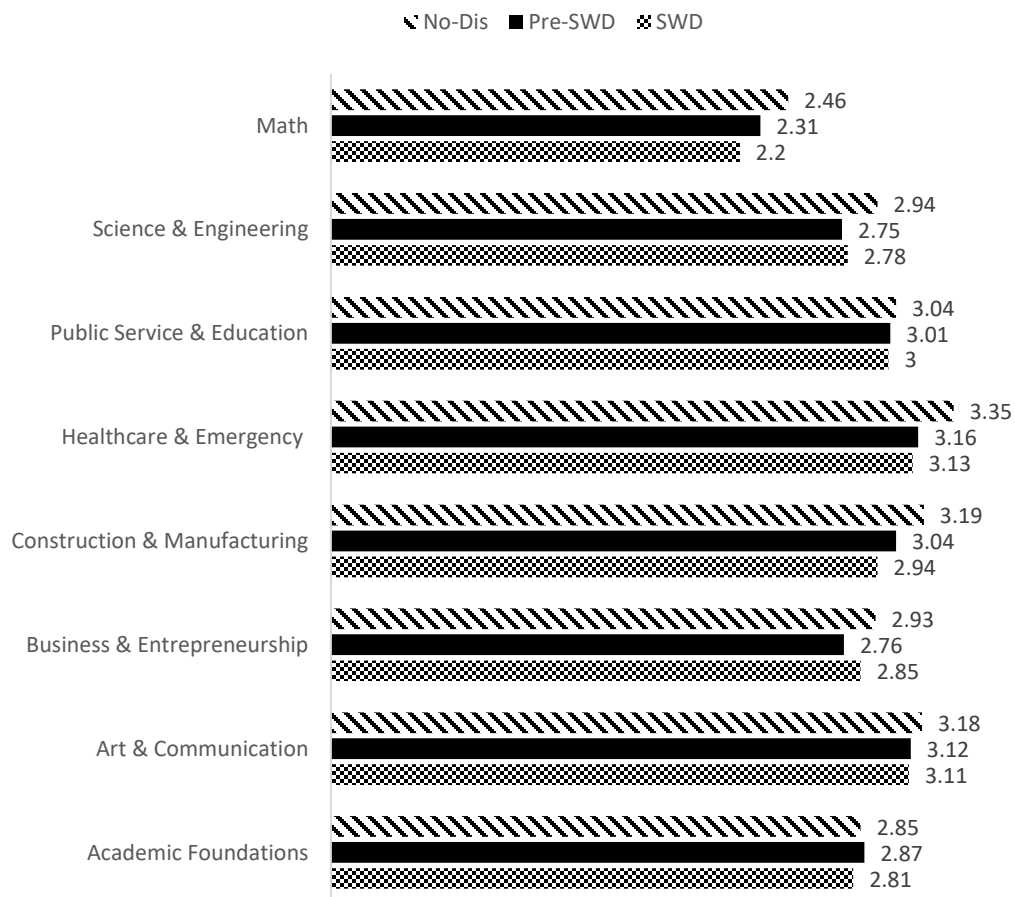
In every pathway, except for Academic Foundations, the highest average Course GPA was for the group with no known disability status. Also, in every pathway, there were statistically significant differences in the distributions of the Course GPA when comparing SWD with No-Dis, however for the other comparisons, results varied by pathway. The differences between SWD and Pre-SWD were significant in Academic Foundations, Construction & Manufacturing, and Math, but not the others. On the other hand, the differences between No-Dis and Pre-SWD were significant for Art & Communication, for Business & Entrepreneurship, and Healthcare & Emergency Professions, as well as Science & Engineering, and Math.

Pairwise comparisons by Cum GPA group. Since RQ3 was looking at students with a similar Cum GPA, who were then grouped by academic pathway, to see if there were statistically significant differences in the Course GPA per accommodation use status, the first step was to look just at differences in in mean Course GPA per accommodation status by the Cum GPA groupings. The records were split into those with a Cum GPA of 3.0 or above, and for those with a Cum GPA below 3.0 so that pairwise comparisons could be run, see Table 4.6 for the results. With this grouping, the pairwise comparisons confirmed that:

- When students had a Cum GPA that was lower than 3.0, there was not a statistically significant difference between the Course GPA for students who were using accommodation compared to the students who had no known disability status. This type of pattern was consistent with literature that speaks to the accommodation process as "leveling the playing field" as intended.

- When students had a Cum GPA that was 3.0 or above, there was not a statistically significant difference between the Course GPA for students who were eligible for accommodation, but not actually using it compared to the students who had no known disability status.

Table 4.6

Comparisons by Accommodation Status per Cum GPA

Cum GPA Group	Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
Under 3	No-Dis-SWD-Y	1896.821	828.734	2.289	.022	.133
	No-Dis-Pre-SWD	6334.513	734.022	8.630	.000	.000
	No-Dis-SWD-N	9339.192	798.376	11.698	.000	.000
	SWD-Y-Pre-Swd	-4437.692	1083.798	-4.095	<.001	.000
	SWD-Y-SWD-N	-7442.371	1128.377	-6.596	<.001	.000
	Pre-SWD-SWD-N	3004.680	1060.765	2.833	.005	.028
3 and Higher	SWD-Y-Pre-SWD	-6794.591	1275.382	-5.327	<.001	.000
	SWD-Y-SWD-N	-10686.002	1376.154	-7.765	<.001	.000
	Pre-SWD-SWD-N	3891.412	1354.542	2.873	.004	.024
	SWD-Y-No-Dis	-11273.156	933.490	-12.076	.000	.000
	Pre-SWD-No-Dis	-4478.565	901.324	-4.969	<.001	.000
	SWD-N-No-Dis	-587.153	1039.032	-.565	.572	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
 Asymptotic significances (2-sided tests) are displayed. The significance level is .050.
 a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

It is possible that students in this higher GPA group were using tools and techniques that work well to mitigate barriers, outside of the accommodation process, or that students were using self-advocacy skills to work informally with their instructors to have their access needs met. Many possible factors could be explored more fully.

Pairwise comparisons by Academic Pathway. Moving from the broad review of Cum GPA by accommodation status that aggregated all courses in all subjects, the next

pairwise comparisons were more specific. After filtering results for the Cum GPA group, pairwise comparisons of the mean Course GPA across accommodation status were run using the split file command to compare groups based on Academic Pathway. Tables 4.7 and 4.8 provide summaries and Appendix B and Appendix C provide the SPSS output for the pairwise comparisons.

Table 4.7

Comparisons for Low Cum GPA by Pathway

Academic Pathway	p-value is more than .05 statistically similar GPA	p-value is less than .05 statistically different GPA
Academic Foundations	SWD-N vs. SWD-Y	No-Dis vs. SWD-N
	SWD-N vs. Pre-SWD	No-Dis vs. SWD-Y
	SWD-Y vs. Pre-SWD	No-Dis vs. Pre-SWD
Art & Communication	SWD-N vs. Pre-SWD	No-Dis vs. SWD-N
	SWD-Y vs. No-Dis	No-Dis vs. Pre-SWD
	SWD-Y vs. SWD-N	SWD-Y vs. Pre-SWD
Business & Entrepreneurship	No-Dis-SWD-Y	
	SWD-N vs. SWD-Y	
	SWD-N vs. Pre-SWD	
	Pre-SWD vs. No-Dis	
	No-Dis vs. SWD-N	
	Pre-SWD vs. SWD-Y	
Construction & Manufacturing	No-Dis vs. SWD-N	No-Dis vs. SWD-Y
	No-Dis-Pre-SWD	SWD-Y vs. SWD-N
	Pre-SWD vs. SWD-N	
	Pre-SWD vs. SWD-Y	
Healthcare & Emergency	No-Dis-SWD-Y	
	SWD-N vs. SWD-Y	
	SWD-N vs. Pre-SWD	
	Pre-SWD vs. No-Dis	
	No-Dis vs. SWD-N	
	Pre-SWD vs. SWD-Y	

Academic Pathway	p-value is more than .05 statistically similar GPA	p-value is less than .05 statistically different GPA
Public Service & Education	SWD-N vs. SWD-Y	No-Dis vs. SWD-N
	SWD-N vs. Pre-SWD	No-Dis vs. SWD-Y
	Pre-SWD vs. SWD-Y	No-Dis vs. Pre-SWD
Science & Engineering	No-Dis-SWD-Y	
	SWD-N vs. SWD-Y	
	SWD-N vs. Pre-SWD	
	Pre-SWD vs. No-Dis	
	No-Dis vs. SWD-N	
	Pre-SWD vs. SWD-Y	
Math	No-Dis-SWD-Y	SWD-N vs. Pre-SWD
	SWD-N vs. SWD-Y	No-Dis vs. SWD-N
	Pre-SWD vs. No-Dis	
	Pre-SWD vs. SWD-Y	

Table 4.8

Comparisons for High Cum GPA by Pathway

Academic Pathway	p-value is more than .05 statistically similar GPA	p-value is less than .05 statistically different GPA
Academic Foundations	No-Dis-SWD-Y	
	SWD-N vs. SWD-Y	
	SWD-N vs. Pre-SWD	
	Pre-SWD vs. No-Dis	
	No-Dis vs. SWD-N	
	Pre-SWD vs. SWD-Y	
Art & Communication	No-Dis-SWD-Y	No-Dis vs. SWD-N
	SWD-N vs. SWD-Y	Pre-SWD vs. No-Dis
	SWD-N vs. Pre-SWD	
	Pre-SWD vs. SWD-Y	
Business & Entrepreneurship	SWD-N vs. SWD-Y	No-Dis-SWD-Y
	SWD-N vs. Pre-SWD	Pre-SWD vs. No-Dis
	No-Dis vs. SWD-N	
	Pre-SWD vs. SWD-Y	

Academic Pathway	p-value is more than .05 statistically similar GPA	p-value is less than .05 statistically different GPA
Construction & Manufacturing	No-Dis-SWD-Y	SWD-N vs. Pre-SWD
	SWD-N vs. SWD-Y	Pre-SWD vs. SWD-Y
	No-Dis vs. SWD-N	Pre-SWD vs. No-Dis
Healthcare & Emergency	SWD-N vs. SWD-Y	No-Dis-SWD-Y
	SWD-N vs. Pre-SWD	No-Dis vs. SWD-N
	Pre-SWD vs. SWD-Y	Pre-SWD vs. No-Dis
Public Service & Education	SWD-N vs. SWD-Y	No-Dis-SWD-Y
	SWD-N vs. Pre-SWD	Pre-SWD vs. SWD-Y
	Pre-SWD vs. No-Dis	
	No-Dis vs. SWD-N	
Science & Engineering	SWD-N vs. Pre-SWD	No-Dis-SWD-Y
	No-Dis vs. SWD-N	SWD-N vs. SWD-Y
	Pre-SWD vs. SWD-Y	Pre-SWD vs. No-Dis
Math	SWD-N vs. SWD-Y	No-Dis-SWD-Y
	SWD-N vs. Pre-SWD	No-Dis vs. SWD-N
	Pre-SWD vs. SWD-Y	Pre-SWD vs. No-Dis

Observations include:

- For the lower Cum GPA group, there were no significant differences across all accommodation statuses for three pathways: Business & Entrepreneurship, Healthcare & Emergency, and Science & Engineering.

- For the higher Cum GPA group, there were no significant differences across all accommodation statuses for only Academic Foundations.

- In the lower Cum GPA group, there were statistically significant differences between students without disability status and students who used accommodation implying accommodation is not "leveling the playing field" in only a few pathways: Academic Foundations, Construction & Manufacturing, and Public Service & Education.

- In the higher Cum GPA group, there were significant differences between

  students without disability status and students who used accommodation in:

  Business & Entrepreneurship, Healthcare & Emergency, Public Service &

  Education, Science & Engineering, and Math.

While the pairwise comparisons addressed the research question of whether there

were statistically significant differences in the mean course GPA when students were

grouped by a primary demographic characteristic (Cum GPA) and then compared across

accommodation use status by pathway, there are additional descriptive statistics that were

generated to help to illustrate the ways in which those differences show up. Figures 4.4

and 4.5 illustrate the average course GPA differences in the 100 level courses, then the

200 level courses. Figures 4.6 and 4.7 do the same for on-site and online courses.

Figure 4.4

GPA by Accommodation Status per Pathway at 100 Level

	Acad Found	Art & Comm	Bus & Ent	Const & Manuf	Health & Emerg	Pub Ser & Ed	Sci & Eng	Math
SWD-Y	2.85	3.11	2.91	2.94	3.09	3.16	2.78	2.38
SWD-N	2.71	3.05	2.60	2.88	3.00	3.02	2.68	1.97
Pre-SWD	2.86	3.11	2.72	2.91	3.09	3.09	2.70	2.29
No-Dis	2.84	3.16	2.84	3.15	3.27	3.10	2.89	2.48
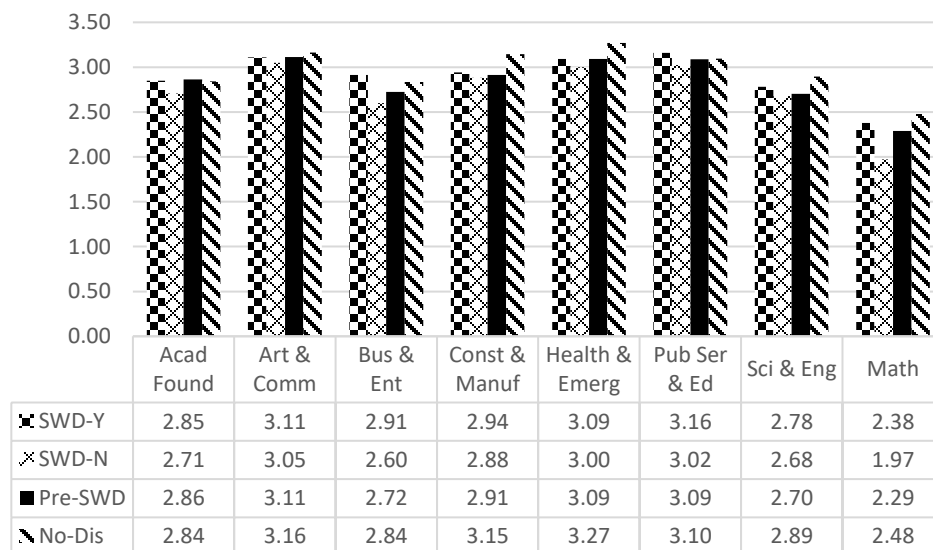
One of the patterns that became quite clear when looking at the average course GPA by pathway per accommodation use status for courses offered at the 100 level is that across the board, the students who were eligible for accommodation but did not notify their instructors had the lowest course GPA. The most extreme differences in average course GPA by accommodation status were observed for Math courses at the 100 level. For these students, use of accommodation may be especially important.

In both the Business & Entrepreneurship courses, and Public Service & Education courses, students who were eligible for accommodation and used it, had an average course GPA that was higher than the average course GPA for students with no known disability status. The situation reversed for courses in the other pathways, where students without disability tended to have a higher average GPA than students with disability status, regardless of accommodation notification status.

This suggests that for students engaged in courses offered at the 100 level, while accommodation use may not truly "level the playing field" in all contexts to the same degree, the absence of accommodation, when it is has been determined to be reasonable, may well be a factor in student success that institutions could try to influence.

The literature points to many factors that influence any given student's decision to notify their instructors of their accommodation eligibility (Kimball et al., 2016). There may be an aspect related to stigma and social reactions (Lyman et al, 2016; Marshak et al., 2010) but also an aspect tied to faith in the accommodation process itself (Kurth & Mellard, 2006), as well as a part that is related to the instructional climate and attitudes of faculty members (Bourke et al., 2000; Jensen et al., 2004; Scott, 1997).

As shown in Figure 4.5, when looking at courses at the 200 level, it was students without disability status who had the highest average course GPA in every pathway except for the Construction & Manufacturing courses, where the highest average course GPA was associated with students in a pre-SWD status.

Figure 4.5

GPA by Accommodation Status per Pathway at 200 Level

200 Level Course GPA

	Acad Found	Art & Comm	Bus & Ent	Const & Manuf	Health & Emerg	Pub Ser & Ed	Sci & Eng	Math
SWD-Y	3.08	3.15	2.96	2.81	3.31	2.99	2.85	2.43
SWD-N	3.10	3.16	2.93	3.18	3.43	2.90	2.87	2.42
Pre-SWD	3.09	3.12	2.81	3.37	3.31	2.96	2.83	2.42
No-Dis	3.16	3.23	3.01	3.27	3.57	3.02	3.02	2.74
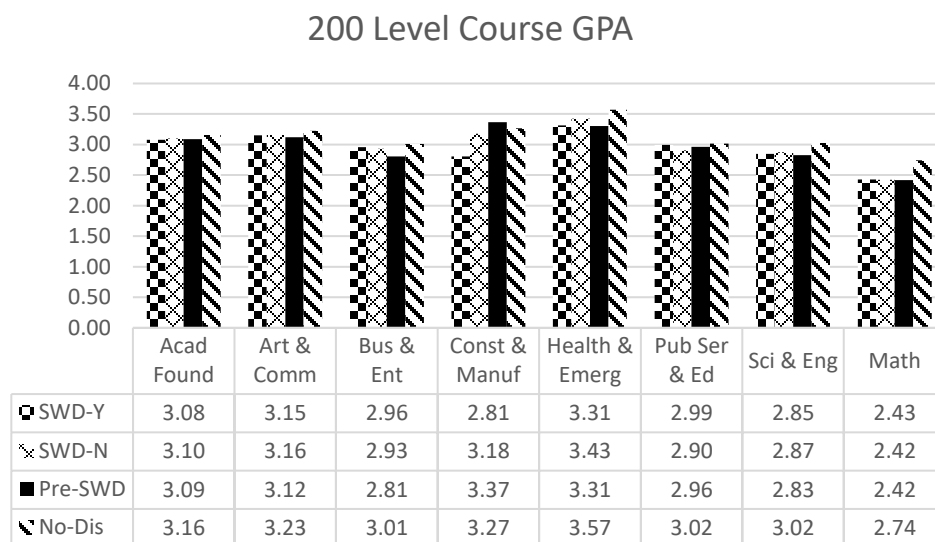
There are many potential factors to consider. For example, students studying at the 200 level may have had more time to develop relationships with faculty and peers that allow them to address access needs informally. Students may have developed compensatory techniques through technology exploration and academic coaching, or they may have learned (through exploration at the 100 level) which environments they thrive in, and self-selected into courses that tend to present fewer barriers for them as learners.

Turning to modality, as shown in Figures 4.6 and 4.7, students who did not notify their instructors of their accommodation eligibility in online courses tended to have a

lower average course GPA, though for students taking Math courses, not notifying

instructors was tied to a lower course GPA for both on-site and online modalities.

Figure 4.6

GPA by Accommodation Status per Pathway for On-Site

	Acad. Found.	Art & Comm.	Bus. & Entr.	Const. & Manuf.	Health & Emerg.	Public Ser. & Ed.	Science & Eng.	Math
SWD-Y	2.87	3.16	2.98	2.89	3.07	3.05	2.81	2.31
SWD-N	2.75	3.14	2.94	2.99	3.02	2.99	2.73	2.05
Pre-SWD	2.91	3.16	2.92	3.04	3.16	3.03	2.75	2.35
No Dis	2.88	3.25	2.96	3.19	3.35	3.09	2.95	2.48
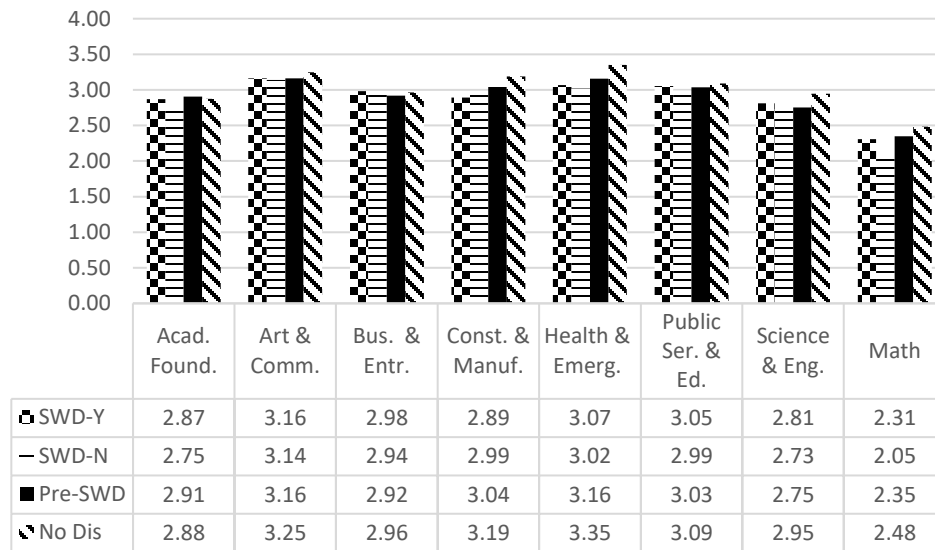
Figure 4.7

GPA by Accommodation Status per Pathway for Online

	Acad. Found.	Art & Comm.	Bus. & Entr.	Const. & Manuf.	Health & Emerg.	Public Ser. & Ed.	Science & Eng	Math
SWD-Y	2.80	2.82	2.88	3.07	3.40	3.05	2.79	2.27
SWD-N	2.64	2.71	2.58	2.50	3.28	2.85	2.80	1.78
Pre-SWD	2.66	2.91	2.61	3.13	3.16	2.94	2.73	1.94
No Dis	2.74	2.92	2.90	2.99	3.36	2.96	2.94	2.26
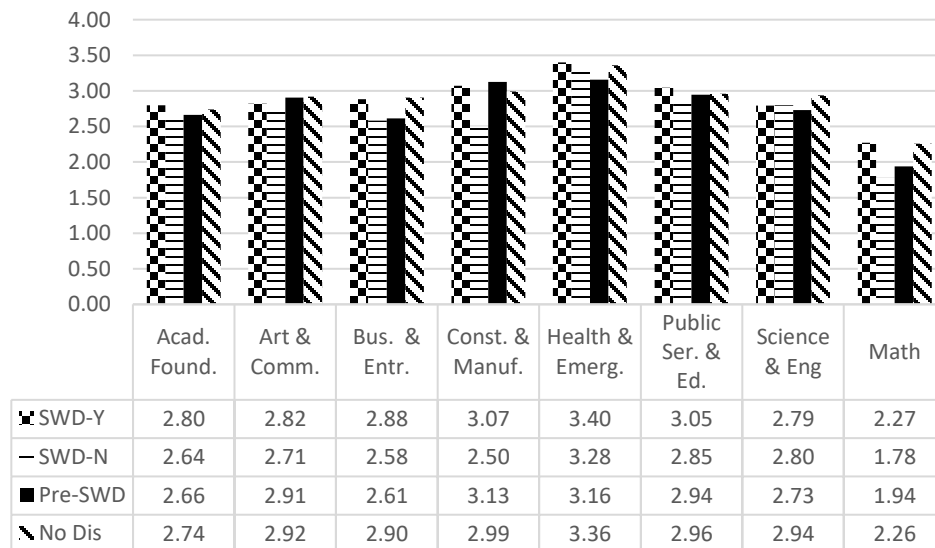
Another pattern that was clear, was that the average Course GPA was higher for on-site courses than online courses in almost all scenarios, with the following exceptions:

- Students in Construction & Manufacturing courses had a higher average course GPA for online courses when they were either in a pre-SWD status, or when they were eligible and notified their instructors, and a markedly lower average course GPA when they were eligible but did not notify. It is important to note that there were a small number of records in this pathway, and most of the courses were offered on-site, not online.

- Students in Healthcare & Emergency courses had an average course GPA that was the same or higher for online courses vs. on-site courses in all categories.

- Students in online Science & Engineering who were eligible for accommodation but did not notify their instructors had a slightly higher average course GPA.

Additional Descriptive Statistics by Academic Pathway and High Enrollment Subject

In addition to the exploration of descriptive statistics for each pathway by level and delivery mode, which were shared in a summary format, there were also interesting patterns that emerged when looking at each pathway by subject and race/ethnicity. For each pathway, there is first a table with descriptive statistics for each subject, including both the percent of students who disclosed disability status to the college (SWD) and the percent of those, who also disclosed accommodation eligibility to their instructors (%Y). After this is a table with descriptive statistics by race/ethnicity. When the number of records was smaller than 50 records, the average course GPA was not shown.

Academic Foundations. The Academic Foundations courses were offered at both the college and pre-college level, with instruction in areas such as Reading, Writing, English, ESOL, and College Guidance. There were 134,269 records for courses in this pathway, and 87.2% of them had an A-F grade assigned, and thus were counted.

Table 4.9

Acad. Found. GPA by Subject and Accommodation Status

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
CG	3.04	3.20	3.11	3.16	3.02		
	n=20,934	n=1,145	n=854	n=1,294	n=17,641	10%	57%
DE	2.79	3.34	--	--	2.74		
	n=665	n=61	n=25	n=36	n=543	13%	71%
ENG	3.16	3.23	2.97	3.03	3.17		
	7,180	n=192	n=213	n=235	n=6,540	6%	47%
ESOL	2.92	2.59	--	2.70	2.95		
	n=5,941	n=122	n=39	n=251	n=5,529	3%	76%
IRW	2.46	2.32	--	--	2.48		
	n=838	n=60	n=27	n=17	n=734	10%	69%
RD	2.56	2.61	2.34	2.61	2.56		
	n=14,635	n=639	n=348	n=636	n=13,012	7%	65%
WR	2.82	2.74	2.62	2.80	2.83		
	n=66,828	n=2,123	n=1,655	n=2,754	n=60,296	6%	56%

Table 4.10

Acad. Found. GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Unknown	2.85	2.95	2.53	2.99	2.85		
	n=8,249	n=293	n=235	n=291	n=7,430	6%	55%
Asian	3.04	2.73	2.92	2.95	3.05		
	n=9,412	n=211	n=144	n=277	n=8,780	4%	59%
Black	2.44	2.37	2.30	2.68	2.43		
	n=9,123	n=398	n=308	n=493	n=7,924	8%	56%
Hispanic	2.79	2.98	2.73	2.73	2.78		
	n=15,735	n=454	n=313	n=599	n=14,369	5%	59%
Multiple	2.72	2.63	2.72	3.02	2.70		
	n=8,369	n=311	n=253	n=450	n=7,355	7%	55%
Native	2.70	2.62	2.82	2.62	2.70		
	n=1,265	n=52	n=51	n=53	n=1,109	8%	50%
Nonresident	2.97	--	--	2.94	2.97		
	n=6,050	n=37	n=30	n=154	n=5,829	1%	55%

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Pacific Islander	2.55 n=855	-- n=19	-- n=14	-- n=12	-- n=810	4%	58%
White	2.92 n=57,963	2.95 n=2,567	2.82 n=1,813	2.89 n=2,894	2.92 n=50,689	8%	59%
Total	2.85 n=117,021	2.86 n=4,342	2.73 n=3,161	2.87 n=5,223	2.85 n=104,295	6%	58%

Art & Communication. There were 127,238 records for courses in this pathway

with the highest enrollments in Art, Communication, Music, Philosophy, and Spanish,

and 86.2% had an A-F grade assigned, and thus were counted.

Table 4.11

Art & Comm. GPA by Subject and Accommodation Status

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
ARCH	3.25 n=5,267	2.95 n=157	2.98 n=145	3.41 n=152	3.27 n=4,813	6%	52%
ART	3.16 n=26,395	3.13 n=1,104	3.06 n=1,263	3.17 n=1,327	3.17 n=22,701	9%	47%
ASL	3.10 n=3,141	2.91 n=113	3.03 n=125	2.82 n=161	3.13 n=2,742	8%	47%
CHN	2.55 n=186	-- n=5	-- n=0	-- n=11	2.61 n=170	3%	100%
COMM	3.13 n=18,057	3.12 n=555	2.90 n=505	3.09 n=584	3.14 n=16,413	6%	52%
D	3.44 n=1,687	-- n=37	-- n=113	3.53 n=93	3.44 n=1,444	9%	25%
FR	3.08 n=1,814	3.02 n=53	3.18 n=60	3.07 n=58	3.07 n=1,643	6%	47%
GD	3.24 n=2,597	3.12 n=82	2.87 n=69	2.86 n=88	3.27 n=2,358	6%	54%
GER	3.18 n=1,553	-- n=39	2.98 n=50	3.21 n=53	3.18 n=1,411	6%	44%
HUM	2.95 n=4,001	2.84 n=117	2.97 n=106	3.11 n=130	2.94 n=3648	6%	52%
ID	3.33 n=1,716	3.11 n=56	-- n=30	3.35 n=54	3.35 n=1,576	5%	65%
ITP	3.36 n=1,005	-- n=28	3.38 n=72	-- n=0	3.39 n=905	10%	28%
J	2.96 n=324	-- n=13	-- n=9	-- n=23	3.03 n=279	7%	59%
JPN	3.06 n=3,130	2.78 n=65	2.82 n=82	3.06 n=142	3.07 n=2,841	5%	44%

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
MM	3.40	3.53	3.42	3.25	3.40		
	n=4,388	n=155	n=219	n=131	n=3,883	9%	41%
MUC	3.41	3.25	3.26	3.25	3.42		
	n=2,626	n=57	n=94	n=100	n=2,375	6%	38%
MUP	3.92	--	--	--	--		
	n=84	n=3	n=43	n=14	n=24	55%	7%
MUS	3.19	3.22	3.23	3.17	3.19		
	n=8,052	n=224	n=420	n=252	n=7,156	8%	35%
PHL	3.05	3.02	2.88	2.96	3.06		
	n=9,219	n=260	n=262	n=277	n=8,420	6%	50%
R	3.06	2.81	2.84	3.09	3.08		
	n=2,320	n=54	n=70	n=86	n=2,110	5%	44%
RUS	3.29	--	--	--	3.30		
	n=925	n=30	n=24	n=24	n=847	6%	56%
SPA	3.24	3.19	3.04	3.05	3.26		
	n=14,813	n=433	n=448	n=596	n=13,336	6%	49%
TA	3.44	3.36	3.43	3.43	3.43		
	n=1,623	n=64	n=116	n=81	n=1,362	11%	36%

There was an unusual pattern in one of the subjects in this pathway. Students with disabilities made up 55% of the total records for MUP courses, but only 7% of the records were for courses in which the instructor was notified of accommodation eligibility. MUP represents Applied Music, and there were less than 100 total records, with courses mainly comprised of individualized instruction.

Table 4.12

Art & Comm. GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Unknown	3.24	3.33	3.10	3.27	3.25		
	n=7,424	n=215	n=305	n=266	n=6,638	7%	41%
Asian	3.33	3.20	3.16	3.53	3.33		
	n=6,132	n=91	n=155	n=159	n=5,727	4%	37%
Black	2.68	2.74	2.35	2.72	2.69		
	n=4,670	n=228	n=200	n=237	n=4,005	9%	53%
Hispanic	3.08	3.07	3.07	2.98	3.08		
	n=11,226	n=285	n=424	n=365	n=10,152	6%	40%
Multiple	3.08	3.21	3.15	3.11	3.07		
	n=8,405	n=358	n=354	n=433	n=7,260	8%	50%

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Native	2.94	--	--	--	2.93		
	n=935	n=26	n=39	n=27	n=843	7%	40%
Nonres.	3.33	--	--	--	3.34		
	n=2,490	n=7	n=17	n=28	n=2,438	1%	29%
Pacific Islander	2.90	--	--	--	2.88		
	n=661	n=13	n=25	n=27	n=596	6%	34%
White	3.22	3.14	3.14	3.13	3.23		
	n=67,713	n=2,324	n=2,661	n=2,743	n=59,985	7%	47%
Total	3.17	3.12	3.09	3.12	3.18		
	n=109,656	n=3,547	n=4,180	n=4,285	n=97,644	7%	46%

Students who identified as White had the highest course GPA when they had no known disability status, but for students who identified as Black, Multi-racial, Native, Pacific Islander, or for those without racial identity data, there was a higher Course GPA when disability was disclosed to the college, and often, providing accommodation notification to faculty was related to the highest average Course GPA.

Business & Entrepreneurship. There were 49,633 records for courses in this pathway, and 90.6% of them had an A-F grade assigned, and thus were counted. There were only two subjects, the majority of enrollments were in Business Administration, with a smaller number of enrollments in Management and Supervisory Development.

Table 4.13

Bus. & Entr. GPA by Subject and Accommodation Status

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
BA	2.96	2.97	2.83	2.80	2.97		
	n=37,041	n=1,037	n=806	n=868	n=34,330	5%	56%
MSD	2.73	2.80	2.61	2.66	2.74		
	n=7,921	n=197	n=440	n=370	n=6,914	8%	31%

Table 4.14

Bus. & Entr. GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Unknown	2.95	3.25	2.87	2.76	2.95		
	n=2,774	n=81	n=53	n=63	n=2,577	5%	60%
Asian	3.15	2.98	--	--	3.17		
	n=3,246	n=64	n=34	n=28	n=3,120	3%	65%
Black	2.27	2.06	2.20	2.42	2.28		
	n=2,700	n=81	n=81	n=131	n=2,407	6%	50%
Hispanic	2.84	2.72	2.66	2.77	2.85		
	n=4,349	n=88	n=105	n=111	n=4,045	4%	46%
Multiple	2.84	3.12	2.97	3.21	2.80		
	n=2,725	n=112	n=108	n=131	n=2,374	8%	51%
Native	2.46	--	--	--	2.48		
	n=362	n=5	n=7	n=9	n=341	3%	42%
Nonres.	3.06	--	--	--	3.06		
	n=1,961	n=11	n=6	n=7	n=1,937	1%	
Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
Pacific Islander	2.71	--	--	--	2.68		
	n=299	n=1	n=3	n=6	n=289	1%	25%
White	2.98	2.99	2.79	2.74	2.99		
	n=26,546	n=791	n=849	n=752	n=24,154	6%	48%
Total	2.92	2.94	2.75	2.76	2.93		
	n=44,962	n=1,234	n=1,246	n=1,238	n=41,244	6%	50%

Construction & Manufacturing. There were 27,202 records for courses in this pathway, and 93% of them had an A-F grade assigned, and thus were counted. This pathway included courses in areas such as Auto Body repair and Automotive Service Technology, Aviation Maintenance, Aviation Science, Apprenticeship, Building Construction, Dealer Services, Electronic Engineering, Electrical Trades, Landscape Technology, Microelectronics, and Welding. These types of courses made up less than 5% of the records in this study.

Table 4.15

Cons. & Man. GPA by Subject and Accommodation Status

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
AB	2.80	--	--	--	2.88		
	n=552	n=20	n=19	n=22	n=491	7%	51%
AM	3.12	2.74	2.94	2.87	3.15		
	n=3,024	n=98	n=161	n=68	n=2,697	9%	38%
AMT	3.01	--	2.84	3.30	3.03		
	n=2,427	n=20	n=119	n=66	n=2,222	6%	14%
APR	2.90	--	--	--	2.94		
	n=701	n=12	n=12	n=13	n=664	3%	50%
AVS	3.35	--	--	--	3.35		
	n=935	n=15	n=23	n=18	n=879	4%	39%
BCT	3.33	3.45	3.00	2.97	3.35		
	n=2,968	n=85	n=76	n=116	n=2,691	5%	53%
CSS	2.81	--	--	--	2.84		
	n=90	n=4	n=4	n=3	n=79	9%	50%
DS	2.93	--	--	--	2.97		
	n=1,275	n=31	n=21	n=45	n=1,178	4%	60%
EET	3.21	3.15	2.77	3.08	3.23		
	n=3,279	n=125	n=104	n=64	n=2,986	7%	55%
ELT	3.42	--	--	--	3.42		
	n=521	n=9	n=21	n=17	n=474	6%	30%
FMT	3.47	--	--	--	3.47		
	n=1,184	n=24	n=34	n=49	n=1,077	5%	41%
HOR	3.19	--	--	--	3.25		
	n=484	n=21	n=16	n=12	n=435	8%	57%
INSP	3.67	--	--	--	3.68		
	n=182	n=5	n=8	n=9	n=160	7%	38%
LAT	3.24	2.58	--	--	3.29		
	n=1,288	n=52	n=42	n=30	n=1,164	7%	55%
MCH	3.19	2.31	2.89	3.53	3.22		
	n=2,090	n=52	n=115	n=74	n=1,849	8%	31%
MT	2.90	2.71	2.55	2.22	2.92		
	n=1,294	n=58	n=31	n=18	n=1,187	7%	65%
WLD	3.14	3.20	3.17	3.00	3.14		
	n=3,027	n=168	n=352	n=256	n=2,251	17%	32%

The discipline with the highest percentage of students with disabilities was welding, but only a third of the student with eligibility elected to notify their instructor. The subject with the highest percentage of students who elected to notify their instructor was MT, which is Microelectronics Technology.

Table 4.16

Con. & Man. GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y	
Unknown	3.23	--	3.49	--	3.24			
	n=1,899	n=45	n=77	n=45	n=1,732	6%		37%
Asian	3.29	--	--	--	3.28			
	n=1,730	n=33	n=11	n=22	n=1,664	3%		75%
Black	2.78	--	--	--	2.82			
	n=766	n=45	n=27	n=29	n=665	9%		63%
Hispanic	3.02	3.05	3.03	2.86	3.02			
	n=2,573	n=98	n=109	n=57	n=2,309	8%		47%
Multiple	3.05	--	2.81	3.02	3.09			
	n=1,192	n=48	n=93	n=102	n=949	12%		34%
Native	2.90	--	--	--	3.10			
	n=174	n=6	n=8	n=7	n=153	8%		43%
Nonresident	3.30	--	--	--	3.29			
	n=456	n=0	n=0	n=3	n=453	0		0
Pacific Islander	2.87	--	--	--	2.78			
	n=136	n=3	n=7	n=2	n=124	7%		30%
White	3.19	2.87	2.95	3.11	3.22			
	n=16,395	n=521	n=826	n=613	n=14,435	8%		39%
Total	3.16	2.90	2.98	3.04	3.19			
	n=25,321	n=799	n=1,158	n=880	n=22,484	8%		41%

Healthcare & Emergency. There were 35,290 records for courses in this pathway, and 88% of them had an A-F grade assigned, and thus were counted. The subjects with the highest enrollments were Dental Assisting, Emergency Medical Services, Food and Nutrition, Health Information Management, Medical Professions, and Nursing. Many of the programs in this pathway are highly competitive.

Table 4.17

Health & Emer. GPA by Subject and Accommodation Status

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
BMZA	3.45	--	--	--	3.51		
	n=238	n=3	n=15	n=22	n=198	8%	17%
DA	3.38	2.62	3.00	--	3.41		
	n=1,840	n=50	n=56	n=0	n=1734	6%	47%
DH	3.78	--	--	--	3.79		
	n=761	n=5	n=0	n=32	n=724	1%	100%
DT	3.48	--	--	--	3.50		
	n=358	n=9	n=0	n=4	n=345	3%	100%
EMS	3.19	--	2.96	2.79	3.21		
	n=2,807	n=45	n=70	n=71	n=2,621	4%	39%
FN	2.95	2.25	2.87	2.91	2.96		
	n=3,664	n=97	n=75	n=139	n=3,353	5%	56%
FP	2.95	--	2.87	--	2.96		
	n=1,515	n=20	n=52	n=32	n=1,411	5%	28%
FT	3.00	2.48	--	2.96	3.04		
	n=1,371	n=58	n=31	n=53	n=1,229	6%	65%
HIM	3.71	3.52	--	--	3.71		
	n=1,767	n=66	n=24	n=12	n=1,665	5%	73%
MA	3.91	--	--	--	3.92		
	n=1,027	n=33	n=21	n=9	n=964	5%	61%
MLT	3.35	--	--	--	3.37		
	n=1,071	n=41	n=25	n=32	n=973	6%	62%
MP	3.18	3.29	3.07	3.04	3.19		
	n=7,553	n=204	n=150	n=257	n=6,942	5%	58%
NRS	3.37	3.21	--	3.17	3.39		
	n=2,951	n=161	n=19	n=212	n=2,559	6%	89%
OMT	3.43	3.19	--	--	3.45		
	n=1,135	n=69	n=20	n=9	n=1,037	8%	78%
RAD	3.50	--	--	--	3.51		
	n=1,371	n=1	n=23	n=39	n=1,308	2%	4%
VT	3.57	3.25	--	--	3.59		
	n=1,610	n=52	n=45	n=12	n=1,501	6%	54%

The students with disabilities in the nursing program and health information management system had especially high rates of disclosing eligibility for accommodation. This could be due to not only the highly competitive nature of the program, but also the reliance on high stakes exams.

Table 4.18

Health & Emer. GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Unknown	3.32	--	--	2.94	3.36		
	n=1,907	n=29	n=28	n=101	n=1,749	3%	51%
Asian	3.45	3.31	--	3.04	3.46		
	n=2,818	n=84	n=25	n=50	n=2,659	4%	77%
Black	2.88	--	--	2.73	2.89		
	n=883	n=37	n=12	n=56	n=778	6%	76%
Hispanic	3.16	3.00	--	3.00	3.17		
	n=2,621	n=62	n=38	n=71	n=2,450	4%	62%
Multiple	3.21	3.06	3.20	3.16	3.22		
	n=1,773	n=84	n=71	n=69	n=1,549	9%	54%
Native	2.91	--	--	--	3.01		
	n=262	n=20	n=4	n=2	n=236	9%	83%
Nonres.	3.38	--	--	--	3.38		
	n=435	n=4	n=13	n=13	n=405	4%	24%
Pacific Islander	3.15	--	--	--	3.15		
	n=202	n=0	n=5	n=3	n=194	2%	0%
White	3.38	3.23	3.15	3.28	3.40		
	n=20,138	n=594	n=430	n=570	n=18,544	5%	58%
Total	3.34	3.16	3.09	3.16	3.35		
	n=31,039	n=914	n=626	n=935	n=28,564	5%	59%

Public Service & Education. There were 158,110 records for courses in this pathway, and 88.7% of them had an A-F grade assigned, and thus were counted. The highest enrollment subject was Psychology, which all on its own had almost as many enrollments as were seen in the entire Healthcare and Emergency Services pathway, and more enrollments than all of the Construction and Manufacturing pathway. The next highest enrollments were in the subjects of Health, History, Sociology, and Economics.

Table 4.19

Pub. Ser. & Ed. GPA by Subject and Accommodation Status

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
AD	3.43	3.40	3.50	3.39	3.43		
	n=6,955	n=504	n=323	n=408	n=5,720	12%	61%
ATH	2.82	2.71	2.67	2.88	2.82		
	n=5,384	n=138	n=135	n=184	n=4,927	5%	51%
CHLA	2.81	--	--	--	2.78		
	n=535	n=14	n=9	n=18	n=494	4%	61%
CJA	3.18	3.30	3.02	3.26	3.18		
	n=5,194	n=107	n=165	n=164	n=4,758	5%	39%
EC	2.78	2.82	2.70	2.69	2.79		
	n=9,986	n=215	n=188	n=228	n=9,355	4%	53%
ECE	2.81	2.84	2.42	2.91	2.82		
	n=2,161	n=103	n=86	n=110	n=1,862	9%	54%
ED	3.08	3.22	3.02	2.86	3.09		
	n=3,153	n=99	n=132	n=81	n=2,841	7%	43%
EM	3.68	--	--	--	3.66		
	n=538	n=27	n=30	n=27	n=454	11%	47%
GEO	3.21	3.21	3.05	3.02	3.22		
	n=4,887	n=119	n=132	n=135	n=4,501	5%	47%
GRN	3.48	3.43	3.41	3.48	3.49		
	n=2,580	n=87	n=164	n=161	n=2,168	10%	35%
HE	3.06	3.05	2.91	2.98	3.07		
	n=21,648	n=608	n=608	n=810	n=19,622	6%	50%
HST	2.82	2.82	2.69	2.59	2.83		
	n=15,172	n=412	n=413	n=468	n=13,879	5%	50%
HUS	2.44	--	--	--	--		
	n=27	n=0	n=2	n=1	n=24	7%	0%
INTL	3.09	--	--	--	3.16		
	n=142	n=7	n=5	n=3	n=127	8%	58%
PL	3.32	3.09	3.03	2.98	3.34		
	n=5,504	n=184	n=156	n=143	n=5,021	6%	54%
PS	3.03	2.94	2.72	2.91	3.04		
	n=4,790	n=142	n=114	n=121	n=4,413	5%	55%
PSY	3.10	3.04	2.91	3.10	3.11		
	n=34,086	n=1,021	n=746	n=1,210	n=31,109	5%	58%
SJ	3.67	--	--	--	3.68		
	n=93	n=2	n=6	n=5	n=80	9%	25%
SOC	2.89	2.88	2.86	2.83	2.89		
	n=14,614	n=437	n=375	n=527	n=13,275	6%	54%
WS	3.07	3.30	3.00	3.17	3.05		
	n=2,857	n=90	n=81	n=118	n=2,568	6%	53%

Some subjects had very low enrollments. The subjects with the highest percentage of students with disabilities, that also had sizable enrollments overall were Addiction Counseling and Gerontology.

Table 4.20

Pub. Ser. & Ed. GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Unknown	3.06	3.05	2.94	3.09	3.07		
	n=8,958	n=305	n=286	n=314	n=8,053	7%	52%
Asian	3.13	2.69	2.98	3.14	3.14		
	n=7,611	n=104	n=120	n=123	n=7,264	3%	46%
Black	2.63	2.78	2.38	2.93	2.62		
	n=7,576	n=350	n=240	n=337	n=6,649	8%	59%
Hispanic	2.92	3.04	2.92	3.09	2.91		
	n=16,428	n=425	n=323	n=557	n=15,123	5%	57%
Multiple	2.91	3.05	2.74	2.82	2.91		
	n=9,620	n=279	n=273	n=442	n=8,626	6%	51%
Native	2.97	2.98	3.13	2.87	2.96		
	n=1,631	n=57	n=92	n=52	n=1,430	9%	38%
Nonres.	3.19	--	--	3.21	3.20		
	n=2,972	n=43	n=22	n=62	n=2,845	2%	66%
Pacific Islander	2.67	--	--	--	2.66		
	n=797	n=7	n=18	n=13	n=759	3%	28%
White	3.10	3.10	3.02	3.01	3.04		
	n=84,713	n=2,746	n=2,496	n=3,022	n=76,449	6%	52%
Total	3.04	3.05	2.95	3.01	3.04		
	n=140,306	n=4,316	n=3,870	n=4,922	n=127,198	6%	53%

Science & Engineering. There were 145,184 records for courses in this pathway, and 87.2% of them had an A-F grade assigned, and thus were counted. The highest enrollment subject was Biology which had over 30,000 records. The next highest enrolled subjects were Computer Applications, Chemistry, Computer Information Systems, and Computer Science.

Table 4.21

Sci. & Eng. GPA by Subject and Accommodation Status

Subject	Total	SWD-Y	SWD-N	Pre-SWD	No-Dis	% SWD	% Y
BI	2.80	2.66	2.57	2.62	2.82		
	n=30,695	n=917	n=531	n=1149	n=28,098	5%	63%
BIT	3.26	2.60	--	--	3.33		
	n=974	n=60	n=47	n=30	n=837	11%	56%
CADD	3.54	3.48	3.44	3.62	3.55		
	n=2,400	n=95	n=109	n=52	n=2,144	9%	47%
CAS	3.01	2.99	2.76	2.98	3.02		
	n=22,812	n=806	n=768	n=916	n=20,322	7%	51%
CH	2.93	2.68	2.75	2.74	2.95		
	n=15,298	n=474	n=310	n=528	n=13,986	5%	60%
CIS	2.98	2.73	2.73	2.74	3.00		
	n=15,874	n=515	n=416	n=517	n=14,426	6%	55%
CMET	3.25	2.98	3.22	2.98	3.29		
	n=2,101	n=120	n=92	n=101	n=1,788	10%	57%
CS	2.69	2.62	2.50	2.36	2.71		
	n=9,887	n=271	n=216	n=337	n=9,063	5%	56%
ENGR	3.19	3.01	2.86	2.97	3.22		
	n=3,442	n=97	n=109	n=94	n=3,142	6%	47%
ESR	3.06	3.02	2.85	2.80	3.08		
	n=2,336	n=119	n=62	n=84	n=2,071	8%	66%
G	2.94	2.80	2.73	3.06	2.95		
	n=3,385	n=109	n=113	n=69	n=3,094	7%	49%
GS	2.99	2.96	2.77	2.76	3.01		
	n=5,030	n=161	n=134	n=127	n=4,608	6%	55%
OS	2.98	2.95	3.04	--	2.99		
	n=1,594	n=83	n=57	n=41	n=1,413	9%	59%
PHY	2.84	2.72	2.51	2.68	2.86		
	n=8,230	n=233	n=179	n=213	n=7,605	5%	57%

Table 4.22

Sci. & Eng. GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Unknown	3.01	2.85	2.75	2.76	3.03		
	n=7,993	n=282	n=173	n=221	n=7,317	6%	62%
Asian	3.03	2.46	2.87	3.01	3.04		
	n=9,965	n=130	n=135	n=144	n=9,556	3%	49%
Black	2.34	2.42	2.06	2.40	2.34		
	n=4,973	n=214	n=119	n=199	n=4,441	7%	64%
Hispanic	2.68	2.67	2.35	2.59	2.69		
	n=11,254	n=314	n=248	n=383	n=10,309	5%	56%

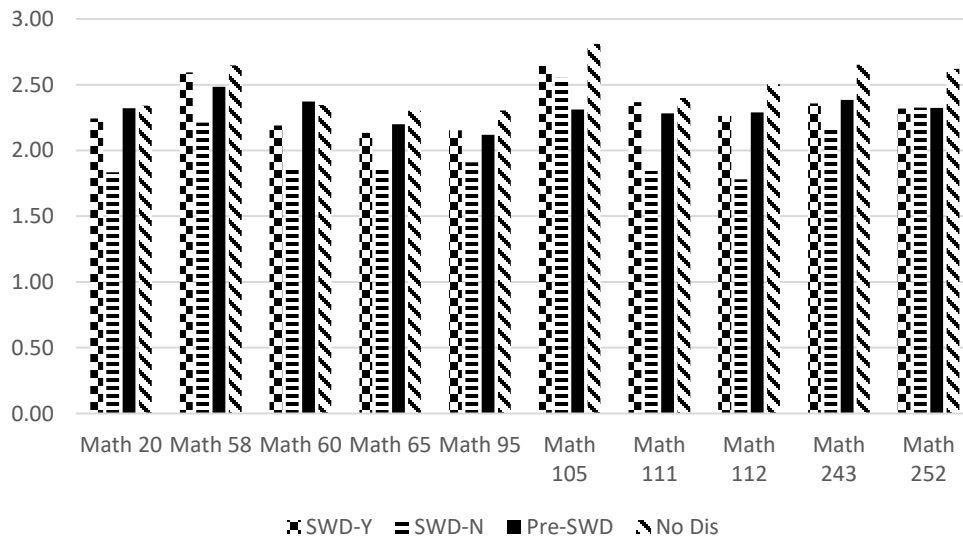| Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Multiple	2.84	2.79	2.88	2.84	2.84		
	n=7,359	n=253	n=225	n=309	n=6,572	6%	53%
Native	2.79	--	--	--	2.81		
	n=962	n=46	n=28	n=28	n=860	8%	62%
Nonres.	3.09	--	--	2.86	3.10		
	n=3,151	n=47	n=23	n=51	n=3,030	2%	67%
Pacific Islander	2.53	--	--	--	2.52		
	n=568	n=2	n=3	n=17	n=546	1%	40%
White	2.99	2.86	2.81	2.77	3.01		
	n=77,833	n=27,72	n=2,189	n=2,906	n=69,966	6%	56%
Total	2.93	2.81	2.75	2.75	2.94		
	n=124,058	n=40,60	n=3,143	n=4,258	n=112,597	6%	56%

Math. Math courses were offered at both the college and pre-college level and most degrees and certificates have math requirements. There were 118,861 records for math courses, and 84% of them had an A-F grade assigned, and thus were counted.

Since math is already a single subject, the first table that follows focused on the highest enrollment courses, starting with pre-college math courses, and including examples from both the 100 and 200 level. Some math courses were designed to be taken by students pursuing STEM fields, others were designed for students looking for non-STEM related degrees and certificates.

After the table that details outcomes for students in the high enrollment math courses, a figure is provided to help illustrate the patterns for the high enrollment courses. Another table follows that provides the same type of breakdown by race/ethnicity that was provided for the other pathways.

Table 4.23

Math GPA by Course and Accommodation Status

Course	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
20	2.33	2.24	1.83	2.32	2.34	6%	67%
	n=9,208	n=381	n=187	n=461	n=8,179		
58	2.62	2.62	2.59	2.21	2.48	12%	71%
	n=2,581	n=227	n=94	n=122	n=,2138		
60	2.33	2.33	2.19	1.86	2.37	4%	64%
	n=15,492	n=440	n=250	n=683	n=14,119		
65	2.28	2.13	1.88	2.20	2.30	5%	57%
	n=12,676	n=357	n=273	n=523	n=11,523		
95	2.28	2.15	1.91	2.12	2.30	5%	61%
	n=13,906	n=407	n=258	n=524	n=12,717		
105	2.78	2.64	2.55	2.31	2.81	7%	52%
	n=2,330	n=84	n=78	n=64	n=2,104		
111	2.38	2.37	1.85	2.28	2.40	5%	61%
	n=11,058	n=319	n=207	n=360	n=10,172		
112	2.47	2.26	1.78	2.29	2.50	5%	62%
	n=5,140	n=163	n=100	n=179	n=4,698		
243	2.63	2.36	2.18	2.39	2.65	4%	64%
	n=8,606	n=235	n=130	n=257	n=7,984		
252	2.60	2.32	2.33	2.32	2.62	5%	63%
	n=2,998	n=88	n=52	n=99	n=2,759		

Figure 4.8

GPA by Accommodation Status per Math Course

Across all race/ethnicity categories, the students who were eligible for accommodation but did not notify faculty had the lowest average course GPA. This pattern was especially pronounced for students who identified as Asian or Black. Also important, was that students who identified as Black had significantly lower average course GPA than their peers across all accommodation use categories.

Table 4.24

Math GPA by Race and Accommodation Status

Race Ethnicity	Total	SWD-Y	SWD-N	Pre-SWD	No Dis	% SWD	% Y
Unknown	2.44	2.20	1.85	2.26	2.47		
	n=6,847	n=229	n=145	n=219	n=6,254	5%	61%
Asian	2.68	2.29	1.74	2.38	2.71		
	n=6,663	n=108	n=76	n=152	n=6,327	3%	59%
Black	1.93	1.65	1.28	1.95	1.96		
	n=5,140	n=184	n=105	n=246	n=4,605	6%	64%
Hispanic	2.23	2.21	1.90	2.14	2.24		
	n=12,691	n=336	n=187	n=400	n=11,768	4%	64%
Multiple	2.32	2.34	2.06	2.26	2.33		
	n=6,901	n=253	n=141	n=290	n=6,217	6%	64%
Native	2.16	--	--	--	2.18		
	n=947	n=41	n=14	n=32	n=860	6%	75%
Nonres.	2.91	--	--	--	2.08		
	n=2,536	n=30	n=10	n=52	n=2,444	2%	75%
Pacific Islander	2.08	--	--	--	2.08		
	n=735	n=8	n=2	n=16	n=709	1%	80%
White	2.51	2.39	2.14	2.37	2.53		
	n=57,335	n=2,117	n=1,280	n=2,368	n=51,570	6%	62%
Total	2.44	2.31	2.03	2.31	2.46		
	n=99,795	n=3,306	n=1,960	n=3,775	n=90,754	5%	63%

Summary of Findings

This research explored the final grades assigned to college students, with disability status and accommodation use at the center, while acknowledging demographic and course characteristics. There were three research questions, the first asking if there were statistically significant differences in the average Course GPA when records were grouped by demographic characteristics then compared across disability status, and the

second asked a similar question but grouped records by delivery method. The third

question delved more deeply into the differences in course GPA when records were first

grouped by their cumulative GPA and then further grouped by academic pathway. The

findings at each level of inquiry were significant and point to a need for additional

research.

The first research question asked if there were statistically significant differences

in the average Course GPA, when records were grouped by demographic characteristics

then compared across disability status. The demographic characteristics used in analysis

included both gender and race/ethnicity. For Gender, there were three groups, male,

female, and other. The "other" category potentially included students who identified as

non-binary, as well as students for whom no gender information was provided. There was

a significant difference between the mean Course GPA of students with No-Dis status,

vs. students who had either a Pre-SWD or SWD status across all genders, and the pattern

of female students having the highest GPA was consistent.

The second part of the first research question, the part that focused on

race/ethnicity, was more nuanced in terms of findings. Disability inequity varied across

racial identity groups. For students who identified as Asian, White, or Nonresident, the

students with No-Dis status had the highest average Course GPA, which is what was

observed when looking at the comparisons by gender. However, for students who

identified as Pacific Islander it was SWD who had the highest average Course GPA, and

for students who identified as Black or indicated Multiple racial identities, the highest

average Course GPA was for those with a future disability status. Also important, was

that racial inequity persisted across all disability status groups. Students who identified as

White had a higher Course GPA than the total in all disability status groups, while students who identified as Black, Hispanic, or Native, had lower Course GPAs than the total, in all disability status groups.

The second research question looked for statistically significant differences in the mean Course GPA when records were grouped by delivery method then compared across disability status. The results confirmed significant differences between those with No-Dis and Pre-SWD or SWD in both on-site and online courses, but no significant differences between Pre-SWD and SWD in either delivery methods. This same pattern held true when looking at timing for course delivery, with the exception of courses offered over the weekend, where there were no statistically significant differences across disability status.

The third research question was much more complicated. While the comparisons across disability status had confirmed significant differences between those with SWD and No-Dis status for every pathway, once accommodation use and Cum GPA were included, it became clear that the relationship between accommodation use and academic performance was most pronounced for students who had a lower Cum GPA, students who were studying at the 100 level, and students who were studying Math.

The institutional data used in this study relied upon the type of information that should often be available to practitioners, and the analysis that was performed used straight-forward techniques with the hope of encouraging curiosity and exploration at other institutions. The patterns that emerged in this study were intriguing and could prompt additional questions for the community of practice.

It would be helpful to include more qualitative data to complement quantitative work. Institutions would benefit from ongoing analysis of both quantitative and

qualitative data regarding the outcomes and experiences of students with disabilities who do and do not use accommodation within particular types of teaching and learning environments. Beyond studying these patterns, institutions and the students they serve would likely benefit from an application of the findings to work in both Academic and Student Affairs. Implications for practice and further recommendations are explored in greater detail within the following chapter.

Chapter Five: Implications

Disability is a normal and natural part of human life, yet often it is an aspect of

identity that is not embraced as fully and openly as other aspects of diversity within

higher education (Shallish, 2015). Even though an ever-growing percentage of college

students have lived experience with disability, with an increase from 11% of all students,

to around 19% over the last several years (NCES, 2015, 2018) disability is seldom

included in campus discussions about diversity and equity (Kimball et al., 2016). It is rare

for institutional surveys to provide students with an opportunity to claim disability as an

aspect of their identity (Avellone & Scott, 2017). This makes it harder to ensure college

leadership and instructional faculty are equipped with quantitative and qualitative data

essential to understanding of student needs.

The Impact of the COVID-19 Pandemic

This study was conducted by a practitioner/director who was invested personally

and professionally in advancing the field of disability in higher education. The

implications for practice that are shared here, come from the study itself, but also from

observations of what happened at this large urban community college during the COVID-

19 pandemic that forced a rapid pivot into remote operations.

The shift to remote operations was difficult on many levels. At the student level,

there were decreases in access to basic needs (The Hope Center, 2020) and limited access

to the technologies needed to engage in remote studies (Hart et al., 2021; Levin, 2020) as

well as a decreased sense of belonging and connection and increased concern for mental

and physical health (Blankstein et al., 2020) and increased family demands (Madaus,

Gelbar, & Faggella-Luby et al., 2021). At the institutional level, there were variations in

the level of preparedness for going remote, as well as variations in the type and level and responses offered (Hart et al., 2021). For disability personnel at colleges and universities, there were also varying levels of challenge reported in regard to collaboration and administrative support (Aquino & Scott, 2021). Despite these challenges, according to a national survey of students with disabilities, those who responded did indicate an overall positive perception of institutional support (Madaus, Gelbar, & Faggella-Luby et al., 2021) though it is critical to acknowledge that the students who did not complete the survey may have had different perceptions, and students who stopped attending may not have had the opportunity to provide feedback.

     For the institution where this data was collected, there was strong collaboration and administrative support both before and during the pandemic. There was also a pre-existing practice of meeting with students remotely, as well as a robust technology loaner and technical support program that allowed the disability office to provide students with disabilities with access to laptops, tablets, microphones, and wi-fi hotspots. This may have reduced these kinds of difficulties that were often reported by students (Blankstein et al., 2020; Hart et al., 2021) and disability office personnel (Scott & Aquino, 2020).

     Because this research was conducted by a director/practitioner at the institution where these data were collected, the outcomes of students with disabilities during the time frame of 2018 through 2022 were also available, and that data was analyzed as part of ongoing program evaluation work. While there are many caveats, including concerns about lower standards and grade inflation, students with documented disabilities at this large urban community college did complete more credits and earn a higher GPA on average during remote operations, and the gaps between students with and without

disabilities decreased. This is not evidence of a causal relationship, but it does open intriguing questions. While the shift to remote operations was difficult, and created many challenges, did it also reduce some barriers, and increase flexibility in ways that could have benefited a wide swath of students, especially those with disabilities? We can and should question the value placed on letter grades and GPA in general, but also, in regard to gains observed during remote operations, we should specifically recognize that:

> During the initial weeks of the Covid-19 pandemic, many acknowledged that grades received during the spring of 2020 might not be representative of true scholastic achievement but marred by myriad other factors. The discussion of how pandemic-related disruptions would negatively impact the academic records of students caught in the maelstrom led to acceptance of the need to 'hold students harmless' when grading (Castro et al., 2020).

These calls for benevolence reaffirm an unspoken reality: grades can be used to harm students. The timing of these messages imply we are comfortable harming students with grades as long as a global pandemic is not raging. When all students had to weather a life altering disruption, our ironclad grading policies softened, and we found a way to make it work. Unfortunately, when equally life altering disruptions happen on an individual level, the willingness of our policies to acknowledge individual hardship are often less kind and less equitable. (Green, 2022 p. 43).

The traditional post-secondary approach that has dedicated resources to ensure accommodation is available to students with disabilities may have allowed institutions to be complacent, considering the issue "handled" and thus feeling less motivation to engage in institutional research to identify and make more meaningful changes that

acknowledge and address barriers in the design of the systems themselves. This is unfortunate given the potential for open and accessible practices to reduce barriers at the design stage (Burgstahler & Cory, 2010; Funckes et al., n.d; Higbee & Goff, 2008; Parks, 2021 May; Scott et al, 2003) and is especially important when we consider the racialized aspects of the disability experience. The type of "diagnosis" that has been made, the likelihood of being offered individualized supports, the implicit bias and stigma: navigating a college accommodation process may not feel the same or work the same for all individuals, and race, gender, age, language of origin, and other aspects of identity will be factors.

If education is indeed the surest path to better wages and more stability, then educational paths must be navigable. If larger system changes that reduce barriers at scale have a greater ability to shift outcomes than individual accommodation, then while many of the changes made during the pandemic may be fleeting (Gardner, 2020) this does not need to be the case. The lessons learned could translate into lasting changes (Basch et al., 2022; Parks, 2021 April; Pichette et al, 2020), and lessons learned during remote operations did help to inform the implications for practice from this study.

Recap of Study

The study explored the final grades awarded to students attending an open enrollment community college in the pacific northwest. The study focused on the A-F grades for courses taken between Fall 2014 and Summer 2018. The records were collected for all students who had a formal connection with the Disability Services office, as well as their classmates. The students were grouped by disability and accommodation status, with categories that included students with documented disabilities who did and

did not notify their instructors of eligibility for accommodation, students with no known disability status, as well as students, who at the time of being awarded a grade in a class had not yet disclosed disability status, but did so in a future term. This last category is called Pre-SWD and represents one of the more unique aspects of this study, in terms of being able to see relationships where disability may be present, but not fully addressed with social and academic supports that come from a formal connection with the college's disability services, but also, where disability may be present, along with a personality or set of circumstances or skills that make it more likely/possible to navigate the disability self-disclosure and accommodation request process. The courses were grouped by academic pathway and further sorted by mode of delivery, subject, and timing.

Research Questions

The first question focused on demographics. Knowing that race as well as gender have often been identified as factors related to differences in grade distributions, the student records were first grouped based on demographic characteristics, then examined for statistically significant differences when compared across disability status. The second question was similar but focused on course characteristics rather than student characteristics. Instead of demographics, the groupings were based on delivery mode and meeting time. The third question delved deeper into the nuances of accommodation use and academic pathway and added the Cumulative GPA as an additional grouping mechanism.

As discussed in the methodology section, the Course GPA was used as the dependent variable because it allowed for a granular analysis of how academic success varied by disability and accommodation use status. While the Cumulative GPA was an

average of all grades issued to a particular student across all prior terms, and thus across disability and accommodation use status, the Course GPA was the average of grades issued to students in a particular class in which each student had a specific disability and accommodation use status.

RQ1 Demographics

Across disability status, female students tended to have a higher course GPA than male students, with students who have other gender status falling between the two. In each case, the GPA was highest for students without disability status and the difference between the No-Dis status and the Pre-SWD or SWD groups were greater than the differences between the Pre-SWD and SWD groups. Given the dearth of research exploring the importance of gender and sexuality in the lives of college students with disabilities (Kimball et al., 2018) it is important for institutions to engage in additional critical research. While a majority of historical research that has focused on gender has done so in binary terms, for example finding that disability may detract from positive gender expectations and exacerbate negative ones (McDonald et al., 2007) there is less research on the intersection of non-binary and genderqueer identity with disability status, though it does seem that online communities are especially important for this group (Miller, 2017) and that some educational climates may be especially difficult for queer disabled students to navigate due to a combination of heteronormative spaces, physical and social inaccessibility on campus and a lack of intersectional resources (Miller & Downey, 2020).

The picture was complicated when exploring grades by disability status and race/ethnicity. There were some groups who tended to have an average Course GPA that

was higher than the average for the total population, and for students who were White, this was true across all disability statuses, while for students who identified as Black, Hispanic, or Native, the average Course GPA was lower than the average for the total population across all disability statuses. For the remaining groups, there was a mix. For example, Asian students with no disability status, or a future disability status, had a higher average Course GPA, while for those who identified as Pacific Islander, or with Multiple race/ethnicities, it was the students with current or future disability status who had the higher average Course GPA.

Because race and disability interact in complex ways, it is important for institutional responses and supports to be delivered in racially conscious ways. For institutions that are already looking at retention and completion data in disaggregated sets, a more holistic understanding could be gained by ensuring race and disability are examined along with other demographics, rather than looking at each demographic in isolation. In addition to these types of quantitative analyses, institutions could learn much by also ensuring there is qualitative research that allows student narratives to be shared.

Recommendations for Practice Related to Demographics

Ideally, institutions should define institutional policy and practice in ways that account for the interlinked nature of racism and ableism. As a first step in a process toward this direction, colleges and universities could find ways to ensure disabled students are able to inform the accommodation process directly, and to do so in ways that acknowledge aspects of their lived experiences including gender and race/ethnicity. This study did not explore socio-economic status, language proficiency, or any number of other aspects of identity that are also likely to be powerful elements influencing aspects

of the disability and accommodation experience at college so further study along those dimensions is needed. Studying disaggregated outcomes for students with these types of factors in focus is important, but not sufficient. In addition to quantitative study, institutions should also be engaging in qualitative research, and asking students directly about their experiences. This type of effort could improve the ability of the institution to make meaningful changes in ways that lead most directly to improved outcomes.

Also, while all students need encouragement and support, it may be that identity-based student-led programming and peer connections could help ensure students who are actively looking for more connections and support, get holistic exposure to resources. At the institution where this study was conducted, there have been a variety of resource centers offered as connection points for students. While the institution has now created a Disability Cultural Alliance for disabled students, and also created Student Advocate positions that compensate disabled student leaders who are interested in serving alongside professional staff to develop programming, nurture peer connections, and inform practice, the Disability Services area did not have their own Resource Center during the 2014 through 2018 time frame when the data used in this study was being generated. There were however strong relationships, and joint funded student leadership roles and programming.

The college had a Women's Resource Center (WRC), and while all genders were welcome to benefit from the center, women were the primary population served. The college had a Queer Resource Center (QRC) which also served everyone, but especially the queer and gender non-binary community. The college had a Multicultural Center, a Men of Color program, and a Dreamers Center as well as a Veterans' Resource Center

(VRC), Athletics, Student Clubs, and other points of convergence. While the Disability

Services department had stronger connections to some of these spaces, and more limited

collaborations with others, the idea is that anywhere students gather around shared

identity or passion area, disability is present as well. The goal should be to ensure

connections throughout Academic and Student Affairs build on inclusion work to

normalize access needs and the use of disability resources and services.

RQ2 Delivery

The second question shifted the focus from individual demographics to aspects of

course delivery. Given the extensive literature that demonstrates differences in grade

distributions based on delivery mode (online vs. in-person), with some research

indicating students with disabilities fare better in online courses (Stewart et al., 2010),

this research question was addressed by first grouping student records based on the

methods of delivery, then running comparisons by disability status to see if additional

differences in grade distributions were statistically significant. RQ2: Are there

statistically significant differences in the average Course GPA, when records are grouped

by delivery method then compared across disability status?

The first thing that was evident upon exploration was a higher ratio of students

with disabilities vs. students with no known disability status in the in-person courses vs.

online courses. Also, while the Course GPA was higher for on-site courses than online

courses for all groups, there was a bigger difference between the two modalities for

students with a future disability status, compared to those who were already fully

connected with the Disability Services office, and thus eligible for accommodation.

This may suggest that institutions have an especially critical responsibility in terms of creating a climate where students with disabilities who are taking online courses and have not yet disclosed formally to the college feel supported to do so. Both faculty teaching online courses, and student support personnel who are working with online students may need to consider culturally relevant ways to encourage use of resources.

The lower rate of participation in online courses may have been due to many different factors. Online courses tended to require a higher degree of time management and intrinsic motivation, given the lack of regular meetings with instructors. Despite the college's robust technology loaner and technical support program there were likely many students who did not know these resources were available to them, so barriers in access to technology cannot be discounted.

When the college shifted rapidly to remote operations emergency funds were used to equip students with laptops and hotspots, but again, it is unlikely that all students who could have benefited from these resources did. It may be that the students who already had access to technology, or gained it, and continued their studies during remote operations, also gained skills along the way that could translate to different patterns in course outcomes across modalities if evaluated again in a post-pandemic timeframe. This data should be tracked further.

For this institution, during the time frame of the study, there was a clear distinction between the two modalities. Online courses were designed to be completed almost entirely asynchronously, with no set meeting times, but with clearly established expectations and deadlines, whereas remote courses did have established meetings where students were expected to login and attend class together remotely, and at least during the

early phases of the pandemic, even when deadlines were established, there was a greater institutional will to afford significant flexibility to those who requested extensions.

Recommendations for Practice Related to Delivery

Some students who benefit from the structure provided by traditional on-site courses that have set meeting times, and who rely on interactions between students and their peers to feel motivated and engaged in learning, may have found that remote courses kept the structure they needed in place while removing or reducing barriers related to transportation and navigation of campus environments. Institutions may be able to leverage positive aspects of remote instruction to attract and retain students who have historically felt pushed out of, or not able to participate in, traditional on-site or online courses (Pichette et al., 2020).

Remote courses as a distinct modality may prove to be important for institutions to consider as part of overall enrollment strategy. While additional research could help to identify the degree to which this modality could fill a niche and promote participation, there would also need to be sustained efforts to equip those without access to technology with both the devices and training they would need to benefit from such offerings.

RQ3 Outcomes by Cum GPA and Pathway

The third question moved from pair-wise comparisons based on disability status, into the complexity of how accommodation effectiveness may differ in the context of different disciplines, taking past academic performance into account. RQ3: After grouping records by Cum GPA, are there statistically significant differences in the average Course GPA, when records are further grouped by Academic Pathway and compared across accommodation status?

When exploring the Course GPA for students by pathway, a classification tree was first used to verify that the characteristic most impactful on Course GPA is Cumulative GPA. The subsequent exploration and analysis then followed for each of two groups, those with a Cumulative GPA lower than 3.0, and those with a Cumulative GPA that is 3.0 or higher.

One of the key findings of this study was that the patterns truly do become more nuanced and impactful when disaggregated, although one of the challenges that emerged was the relatively small number of records in some categories. For example, at the broadest level it appeared that across almost all disability types, the students who were eligible for accommodation, and therefore connected with the disability services team, who *did not* notify their instructor of accommodation eligibility, had a higher average Course GPA than peers who did notify instructors of their accommodation eligibility. However, once the records were examined separately for the 100 level and 200 level it became clear that at the 100 level, the students who did not notify their instructors had a consistently lower course GPA and those who did notify their instructors had a consistently higher course GPA, even though the situation did not hold at the 200 level.

When the Cum GPA was lower, students with a connection to disability services had a higher Course GPA than their non-disabled peers, while the Course GPA for students who had a higher Cum GPA was highest when there was no known disability status. This may support a theory that there are benefits to a connection with the disability services office – benefits that are not always necessarily accommodation related, and that these benefits are most significant for students experiencing the most barriers. The pattern of a higher Course GPA when there was a connection with the disability services

team, even without formal accommodation notification, could be seen across demographic categories. For example, when comparing across gender, or race/ethnicity.

When looking at delivery mode, the picture was similar, in terms of students with a lower Cum GPA generally benefitting from a connection with disability services and having a higher Course GPA than their non-disabled peers, and the situation reversing for those with a higher Cum GPA. However, there was an important standout point. When looking at courses delivered online (as opposed to on-site) the benefit of notifying an instructor of accommodation eligibility was clear, with a higher Course GPA for both the low and high Cum GPA groups. This indicates that it may be especially important to ensure students who are taking online courses are receiving robust information related to the student accommodation process and getting the chance to connect with the disability services team early on.

When looking at the descriptive statistics by pathway, with a focus on high enrollment subjects and courses, the patterns varied, but some of the most extreme and persistent patterns were for Math courses, where students who notified their instructors of their eligibility for accommodation consistently had a higher average course GPA than their peers who were eligible but did not notify faculty.

Math courses are known to rely heavily on timed assessments, and at this institution in this time frame, the final grade was often determined almost entirely by performance on high stakes exams. While there were exceptions, and some courses incorporated more application-based work and project or team based assessments, the implication is that the nature of these courses may have made accommodation use especially impactful in this discipline.

Recommendations for Educators

As noted in the literature, students with disabilities have consistently indicated that negative attitudes and assumptions about ability can serve as barriers to educational support (Baker et al., 2012; Dowrick et al., 2005; Yssel et al., 2016) and the desire to avoid negative social reactions can lead students to choose not to disclose (Lyman et al., 2016; Marshak et al., 2010). Students may be turned off by the bureaucratic nature of the accommodation process (Kurth & Mellard, 2006) and not trust it, but even when students do choose to disclose, not all faculty will understand, or feel prepared to implement accommodation effectively (Baker et al., 2012; Dorwick et al., 2005; Minich, 2016; Rao & Gartin, 2003; Vogel et al., 1999).

Given the ableism and other forms of oppression that are baked into our society, the disclosure of accommodation always comes with risk, and that risk is often disproportionate, impacting those with multiple marginalized identities the most (Berne, 2015; Funckes et al., n.d). It is not enough to ensure students are aware of how to disclose, professional development for faculty is also necessary (Bourke et al., 2000; Burgstahler, 2014; Flink & Leonard, 2019; Higbee & Goff, 2008; Jensen et al., 2004; Lancaster et al., 2001; Scott, 1997). If faculty are able to create a welcoming environment, and include disability positive language in the syllabus and other course communications students may be more likely to disclose.

More broadly, if the college includes disability as a demographic of interest in institutional reporting it sends a signal that this population matters. If the college offers professional development that goes beyond training in minimal compliance with accommodation mandates, and actively encourages instructional faculty to question what

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they think they know about disability, it sends a signal that implicit bias is prevalent and harmful and needs to be interrupted. If the college provides framing wherein disability is understood as a neutral or positive aspect of identity, with coaching for students on communication with instructors, and training on use of technology based tools and techniques, then the combination of those services and resources may have a multi-pronged benefit of increasing a student's sense of connection and belonging to the institution, and increasing the student's ability to navigate an environment that is inherently ableist. These approaches and resources may have the largest positive impact on the students who are most vulnerable and addressing the needs of the most vulnerable fits squarely within the mission and values of many community colleges. Recommendations for practice include:

- Recognizing disability as an aspect of diversity that makes the college community stronger and more vibrant and giving students ways to acknowledge disability identity beyond formal accommodation requests.
- Incorporating disability as a demographic category within institutional effectiveness data reporting so college leaders and instructional faculty who are responsible for engaging in ongoing program review work can better identify the gaps that may exist in their programs and take ownership for becoming better equipped to strategize and understand which tactics are most likely to be most effective in removing barriers while maintaining high standards.
- Involving student voice directly in program improvement work throughout the college, and doing so in ways that honor intersectional aspects of identity, not

only to improve the accommodation process, but to improve access and inclusion in curricular and co-curricular activities. Ideally this would be work facilitated at least in part by disabled students themselves, with compensation.

- Awareness building programming and information sharing that normalizes disability and the presence of access needs and makes it more likely that people who could benefit from accommodation or accessibility related tools, techniques, services, and supports will be able to leverage them with ease. This could mean going beyond canned syllabus statements and website blurbs, and considering language access needs, and culturally relevant connections.

- Further study of the ways in which remote delivery of courses and community building efforts could help to make space for those who have historically been excluded from traditional college delivery methods.

Summary and Conclusion

The percentages of disabled students in our nation's colleges and universities have been increasing over the last several years (NCES, 2015; 2018) yet the rates of employment for individuals with disabilities remain half of that of their non-disabled peers (Lauer & Houtenville, 2017). Colleges and universities have put faith in the student accommodation process, and expect the individualized interactive process of determining eligibility for auxiliary aids and services to be effective in mitigating barriers that might otherwise impede the full participation of individuals who experience disability. However, there is ample evidence that inequity is pervasive (Baker et al., 2012; Dowrick et al., 2005; Horn & Berktold, 1999; Yssel et al., 2016).

There are frameworks such as Universal Design (Burgstahler & Cory, 2010; Funckes et al., n.d; Higbee & Goff, 2008; Parks, 2021 May; Scott et al, 2003) and calls from scholars to take a more critical and systems focused approach to move beyond individual rights-based tactics, toward inclusion and justice (Annamma et al., 2013; Berne, 2015; Nachman & Wilke, 2021; Taylor, Smith & Shallish, 2020). This study used a critical quantitative analysis to investigate the relationship between final course grades and accommodation eligibility and use across academic disciplines and delivery mode (in-person and on-line) at a large urban community college in order to identify possible implications for the academic success of students with disabilities. This approach was taken because there is a dearth of data regarding discipline-specific inclusive teaching practices that are most effective in giving students with disabilities the support they need to thrive (Higbee & Goff, 2008; Kimball et al., 2016; Madaus, Gelbar, & Dukes et. al, 2021; Swanson et al., 1999) and while research like this is only one small piece – having quantitative data that explores outcomes for students with disabilities in pathway specific contexts, may well be a necessary first step in eliciting a level of curiosity on the part of academic leaders that is necessary for opening receptivity to the more qualitative data that comes from disabled students directly. This research took place at a particular time, and in a particular place – and thus will be most meaningful to the people closest to it, however, it does also serve as an example of an approach that could be replicated or adapted for use at other institutions.

The use of Course GPA was important in terms of being able to perform analysis at a level that took both accommodation use status and academic subject matter into account, however the use of GPA at all, and especially the use of Cumulative GPA as an

additional sorting factor, was a thorny choice. The use of GPA is problematic in part because "whether or not students are harmed by grades often boils down to one's amount of privilege (Green, 2022, p. 44)." Additionally, in many ways, the very process of ranking students and assigning value based on a single number is itself a reinforcement of capitalism, and although "the disability rights model…critiques disabled people's lack of access to capitalism" within radical disability politics, it is capitalism itself that is critiqued (Withers et al., 2019, p. 179). Despite the problems with GPA as a measure of student success, this study was focused on using practical methods to try and gain traction, and tracking student performance through assigned grades is very much an ongoing institutional practice. The hope for this research was that because it centered disabled students, and purposefully focused on student choice to disclose rather than focusing on diagnostic labels, it could highlight patterns that spark curiosity and open dialogue that could in turn lead to more transformative change.

Results indicated that students with disabilities have statistically significant lower grade point averages than their non-disabled counterparts, and that this is especially true for Black, Hispanic, and Native American students with disabilities. Students with disabilities tend to have higher course grades when they are eligible for accommodation, though there is variation in outcomes based on whether students do or do not notify their instructors of their accommodation eligibility. Students with lower cumulative grade point averages, students taking courses at the 100 level, taking online courses, and taking courses in disciplines such as math seem to benefit the most from a connection with Disability Services, and for many of these students, use of accommodation does tend to equate to greater academic success.

While program data from 2018 to 2022 was only brought into focus for context, it did did show that during remote operations, the GPA gaps were closing, and retention was higher for students connected to Disability Services. Even with questions about grade inflation, this new modality of remote instruction should be studied further, as it may offer a unique blend of the structured connections with instructors and peers that were beneficial from on-site courses, and reduced barriers associated with travel, on-site campus navigation, and ability to attend to personal care needs that were beneficial from online courses.

Ideally, the inclusion of disability as a demographic of interest within institutional data sets could allow college leaders to better understand where there are equity gaps in terms of outcomes for enrolled students, but also where there are opportunity gaps and lower than expected rates of participation. In addition, these type of data could help educators understand when changes in instructional approaches, or modalities, relate to increases or decreases in those gaps. Additionally, the inclusion of quantitative data regarding the participation and outcomes of disabled students could increase curiosity and motivation to participate in dialogue and learn from qualitative research.

Colleges must not be content with merely providing individual accommodation for students who are sufficiently privileged to navigate the disclosure process, and should instead honor a commitment to open enrollment that aims not just to enroll students, but to provide truly navigable paths. Colleges need to recognize that historic approaches have failed to provide equity for disabled students. Educators who are curious need to be afforded space to work alongside disabled community members so the rich diversity of lived experience has a chance to transform institutions.

One way of thinking about what disability justice might look like in colleges and universities is to consider a vision for "deep accessibility" that recognizes it is not enough to simply address structural barriers by aligning with accessibility standards for the built environment, or ensuring conformance with web content accessibility guidelines, and that instead, we need to move past that first layer of access that is focused on movement, and consider the sensory experiences, sense-making supports, as well as the methods of communication, and level of agency that are afforded to employees and students in our shared teaching and learning spaces (Ford, 2013). If we can make space for this type of vision, a vision of "deep accessibility" then perhaps we can come closer to an educational system that affords more members of our community opportunity for growth.

The findings from this study depicted a much more nuanced landscape than might be imagined absent disaggregation. Without critical inquiry, it could be easy for the experiences of White students to be misunderstood as the experiences of all. Without an examination of outcomes based on accommodation notification status, it might be easy to assume that all students with disabilities who have disclosed to the college are also disclosing to faculty.

This study, and others like it, will not supply "answers" but rather can help us to ask more meaningful questions. We can "employ quantitative approaches…not in place of qualitative inquiry, but rather along with it…to provide a guide to …understanding the material impact of intersectionality, but…also…to grant us greater opportunities to effect change at the policy level (Covarrubias & Vélez, 2013, p. 282)."

Implications and recommendations from this study include adding disability as a demographic within institutional reporting, offering professional development for faculty

and staff that goes beyond compliance, increasing positive referrals for students who

could benefit from disability resources, and including disabled student voices in the

ongoing work to improve curricular and co-curricular programs and activities.

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Appendix A: Pairwise Comparisons - Demographics & Delivery

Pairwise comparisons were run across disability status.

Table A1

Pairwise Comparisons of Disability Status by Race/Ethnicity

RaceEthn	Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
	SWD-PreSWD	-424.120	404.072	-1.050	.294	.882
	SWD-No-Dis	-1171.572	246.390	-4.755	.000	.000
	PreSWD-No-Dis	-747.452	332.191	-2.250	.024	.073
Asian	SWD-PreSWD	-1499.706	530.324	-2.828	.005	.014
	SWD-No-Dis	-2400.150	332.553	-7.217	.000	.000
	PreSWD-No-Dis	-900.444	421.986	-2.134	.033	.099
Black	SWD-PreSWD	-1842.150	315.249	-5.843	.000	.000
	SWD-No-Dis	-344.082	207.972	-1.654	.098	.294
	NoDis-PreSWD	1498.067	251.008	5.968	.000	.000
Multi	SWD-PreSWD	-507.904	354.593	-1.432	.152	.456
	NoDis-PreSWD	1018.764	278.474	3.658	.000	.001
	NoDis-SWD	510.860	237.656	2.150	.032	.095
Nativ	PreSWD-No-Dis	-329.602	128.310	-2.569	.010	.031
	NoDis-SWD	32.688	85.571	.382	.702	1.000
	PreSWD-SWD	362.290	150.342	2.410	.016	.048
Nonres	SWD-PreSWD	-1089.693	428.049	-2.546	.011	.033
	SWD-No-Dis	-1625.704	324.711	-5.007	.000	.000
	PreSWD-No-Dis	-536.011	284.406	-1.885	.059	.178
Pacif	NoDis-PreSWD	234.890	125.748	1.868	.062	.185
	NoDis-SWD	364.274	108.415	3.360	.001	.002
	PreSWD-SWD	129.385	163.808	.790	.430	1.000
White	SWD-No-Dis	-10256.812	702.252	-14.606	.000	.000
	PreSWD-No-Dis	-12096.835	904.980	-13.367	.000	.000
	PreSWD-SWD	1840.023	1115.017	1.650	.099	.297

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is .050.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Table A2

Pairwise Comparisons of Disability Status by Gender

Gender	Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
F	SWD-PreSWD	-509.886	1046.027	-.487	.626	1.000
	SWD-No-Dis	-9173.432	684.522	-13.401	.000	.000
	PreSWD-No-Dis	-8663.546	828.712	-10.454	.000	.000
M	SWD-No-Dis	-4360.873	658.278	-6.625	.000	.000
	PreSWD-No-Dis	-6459.647	889.239	-7.264	.000	.000
	PreSWD-SWD	2098.774	1081.663	1.940	.052	.157
U	SWD-PreSWD	-334.431	213.958	-1.563	.118	.354
	SWD-No-Dis	-619.891	137.588	-4.505	.000	.000
	PreSWD-No-Dis	-285.460	171.597	-1.664	.096	.289

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is .050.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Table A3

Pairwise Comparisons of Disability Status by Timing

Timing	Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
day	SWD-PreSWD	-2916.175	1121.520	-2.600	.009	.028
	SWD-No-Dis	-9435.461	707.077	-13.344	.000	.000
	PreSWD-No-Dis	-6519.286	909.834	-7.165	<.001	.000
eve	SWD-No-Dis	-1801.888	368.891	-4.885	<.001	.000
	PreSWD-No-Dis	-2773.081	453.911	-6.109	<.001	.000
	PreSWD-SWD	971.193	570.569	1.702	.089	.266
mult	SWD-No-Dis	-2602.629	532.716	-4.886	<.001	.000
	PreSWD-No-Dis	-4659.123	656.533	-7.097	<.001	.000
	PreSWD-SWD	2056.493	828.159	2.483	.013	.039
wknd	SWD-PreSWD	-57.951	201.965	-.287	.774	1.000
	NoDis-SWD	176.100	128.108	1.375	.169	.508
	NoDis-PreSWD	234.051	164.124	1.426	.154	.462

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is .050.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Table A4

Pairwise Comparisons of Disability Status by Delivery Mode

Delivery	Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
On-Site	SWD-PreSWD	-1986.416	1280.898	-1.551	.121	.363
	SWD-No-Dis	-10971.445	810.593	-13.535	.000	.000
	PreSWD-No-Dis	-8985.028	1036.297	-8.670	.000	.000
Online	SWD-No-Dis	-3056.454	529.897	-5.768	.000	.000
	PreSWD-No-Dis	-4795.485	647.436	-7.407	.000	.000
	PreSWD-SWD	1739.031	819.829	2.121	.034	.102

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is .050.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Appendix B: Pairwise Comparisons – Course GPA

by Accommodation Status per Pathway for students with Cum GPA<3.0

Academic Pathway		Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
Academic Foundations	No-Dis-SWD-N	1103.875	370.025	2.983	0.003	0.017
	No-Dis-SWD-Y	1219.621	343.294	3.553	0.000	0.002
	No-Dis-Pre-SWD	1681.234	308.684	5.446	0.000	0.000
	SWD-N-SWD-Y	115.746	494.864	0.234	0.815	1.000
	SWD-N-Pre-SWD	-577.359	471.514	-1.224	0.221	1.000
	SWD-Y-Pre-SWD	-461.613	450.841	-1.024	0.306	1.000
Art & Communication	No-Dis-SWD-N	860.521	270.677	3.179	0.001	0.009
	No-Dis-Pre-SWD	1020.214	271.162	3.762	0.000	0.001
	SWD-N-Pre-SWD	-159.693	373.484	-0.428	0.669	1.000
	SWD-Y-Pre-SWD	-1144.689	404.603	-2.829	0.005	0.028
	SWD-Y-No- Dis	-124.475	312.217	-0.399	0.690	1.000
	SWD-Y-SWD-N	-984.996	404.278	-2.436	0.015	0.089
Business & Entrepreneurship	No-Dis-SWD-Y	407.651	240.359	1.696	0.090	0.539
	SWD-N-SWD-Y	544.464	318.759	1.708	0.088	0.526
	SWD-N-Pre-SWD	-67.603	302.979	-0.223	0.823	1.000
	Pre-SWD-No-Dis	-69.211	219.001	-0.316	0.752	1.000
	SWD-N-No-Dis	-136.813	216.796	-0.631	0.528	1.000
	Pre-SWD-SWD-Y	476.862	320.263	1.489	0.136	0.819

Construction & Manufacturing	No-Dis-SWD-N	84.377	106.874	0.789	0.430	1.000
	SWD-Y-Pre-SWD	-365.246	178.727	-2.044	0.041	0.246
	SWD-Y-No-Dis	-482.470	132.340	-3.646	0.000	0.002
	SWD-Y-SWD-N	-566.847	165.221	-3.431	0.001	0.004
	Pre-SWD-No-Dis	-117.224	126.758	-0.925	0.355	1.000
	Pre-SWD-SWD-N	201.601	160.784	1.254	0.210	1.000
Healthcare & Emergency	No-Dis.-SWD-N	120.955	128.275	0.943	0.346	1.000
	No-Dis-Pre-SWD	28.654	116.653	0.246	0.806	1.000
	SWD-Y-Pre-SWD	-222.269	176.064	-1.262	0.207	1.000
	SWD-Y-No-Dis	-193.615	136.424	-1.419	0.156	0.935
	SWD-Y-SWD-N	-314.570	183.971	-1.710	0.087	0.524
	Pre-SWD-SWD-N	92.300	169.828	0.543	0.587	1.000
Public Services & Education	No-Dis-SWD-N	1150.350	369.872	3.110	0.002	0.011
	No-Dis-SWD-Y	1703.632	378.068	4.506	0.000	0.000
	No-Dis-Pre-SWD	1731.965	332.958	5.202	0.000	0.000
	SWD-N-SWD-Y	553.282	519.655	1.065	0.287	1.000
	SWD-N-Pre-SWD	-581.615	487.819	-1.192	0.233	1.000
	SWD-Y-Pre-SWD	-28.333	494.062	-0.057	0.954	1.000

Science & Engineering	No-Dis-SWD-N	617.620	316.592	1.951	0.051	0.306
	No-Dis-SWD-Y	231.854	306.880	0.756	0.450	1.000
	No-Dis-Pre-SWD	254.696	283.392	0.899	0.369	1.000
	SWD-Y-Pre-SWD	-22.842	408.685	-0.056	0.955	1.000
	SWD-Y-SWD-N	-385.766	432.369	-0.892	0.372	1.000
	Pre-SWD-SWD-N	362.924	416.027	0.872	0.383	1.000
Math	No-Dis-Pre-SWD	271.157	293.620	0.923	0.356	1.000
	SWD-N-SWD-Y	1100.320	481.115	2.287	0.022	0.133
	SWD-N-Pre-SWD	-1418.381	462.734	-3.065	0.002	0.013
	SWD-Y-Pre-SWD	-318.060	426.645	-0.745	0.456	1.000
	SWD-Y-No-Dis	-46.903	321.810	-0.146	0.884	1.000
	SWD-N-No-Dis	-1147.224	368.318	-3.115	0.002	0.011

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
 Asymptotic significances (2-sided tests) are displayed. The significance level is .050.
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Appendix C: Pairwise Comparisons – Course GPA

by Accommodation Status per Pathway for students with Cum GPA≥3.0

Academic Pathway		Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
Academic Foundations	No-Dis-SWD-Y	18.754	320.460	0.059	0.953	1.000
	No-Dis-SWD-N	263.899	408.358	0.646	0.518	1.000
	No-Dis-Pre-SWD	591.480	298.662	1.980	0.048	0.286
	SWD-Y-SWD-N	-245.145	511.458	-0.479	0.632	1.000
	SWD-Y-Pre-SWD	-572.726	428.990	-1.335	0.182	1.000
	SWD-N-Pre-SWD	-327.581	498.090	-0.658	0.511	1.000
Art & Communication	SWD-N-Pre-SWD	-417.610	468.489	-0.891	0.373	1.000
	SWD-Y-No-Dis	-844.339	351.105	-2.405	0.016	0.097
	SWD-N-No-Dis	-1338.118	341.262	-3.921	0.000	0.001
	SWD-N-SWD-Y	493.780	481.113	1.026	0.305	1.000
	Pre-SWD-SWD-Y	76.169	475.706	0.160	0.873	1.000
	Pre-SWD-No-Dis	-920.508	333.596	-2.759	0.006	0.035
Business & Entrepreneurship	SWD-Y-SWD-N	-348.286	337.072	-1.033	0.301	1.000
	SWD-Y-Pre-SWD	-110.220	336.535	-0.328	0.743	1.000
	SWD-Y-No-Dis	-826.253	233.514	-3.538	0.000	0.002
	SWD-N-No-Dis	-477.968	249.757	-1.914	0.056	0.334
	Pre-SWD-No-Dis	-716.033	249.031	-2.875	0.004	0.024
	Pre-SWD-SWD-N	238.065	348.002	0.684	0.494	1.000

Construction & Manufacturing	No-Dis-Pre-SWD	647.173	180.344	3.589	0.000	0.002
	SWD-Y-SWD-N	-160.691	246.773	-0.651	0.515	1.000
	SWD-Y-Pre-SWD	-1011.473	257.710	-3.925	0.000	0.001
	SWD-N-Pre-SWD	-850.782	239.843	-3.547	0.000	0.002
	SWD-Y-No-Dis	-364.300	189.462	-1.923	0.055	0.327
	SWD-N-No-Dis	-203.609	164.336	-1.239	0.215	1.000
Healthcare & Emergency	SWD-Y-SWD-N	-650.357	359.826	-1.807	0.071	0.424
	SWD-Y-Pre-SWD	-675.915	309.862	-2.181	0.029	0.175
	SWD-N-Pre-SWD	-25.558	365.845	-0.070	0.944	1.000
	SWD-Y-No-Dis	-1795.270	217.405	-8.258	0.000	0.000
	SWD-N-No-Dis	-1144.913	291.707	-3.925	0.000	0.001
	Pre-SWD-No-Dis	-1119.354	227.228	-4.926	0.000	0.000
Public Services & Education	No-Dis-Pre-SWD	237.301	389.756	0.609	0.543	1.000
	SWD-Y-SWD-N	-87.695	584.773	-0.150	0.881	1.000
	SWD-Y-Pre-SWD	-1456.741	546.411	-2.666	0.008	0.046
	SWD-N-Pre-SWD	-1369.046	580.643	-2.358	0.018	0.110
	SWD-Y-No-Dis	-1219.440	395.882	-3.080	0.002	0.012
	SWD-N-No-Dis	-1131.745	441.933	-2.561	0.010	0.063

Science, Computing, and Engineering	SWD-Y-SWD-N	-2322.888	648.716	-3.581	0.000	0.002
	SWD-Y-Pre-SWD	-600.340	587.192	-1.022	0.307	1.000
	SWD-Y-No-Dis	-3121.127	418.745	-7.454	0.000	0.000
	SWD-N-No-Dis	-798.239	506.807	-1.575	0.115	0.691
	Pre-SWD-No-Dis	-2520.787	425.225	-5.928	0.000	0.000
	Pre-SWD-SWD-N	1722.548	652.917	2.638	0.008	0.050
Math	SWD-Y-Pre-SWD	-541.810	488.711	-1.109	0.268	1.000
	SWD-N-Pre-SWD	-1198.855	625.804	-1.916	0.055	0.332
	SWD-Y-No-Dis	-2598.886	358.256	-7.254	0.000	0.000
	SWD-N-No-Dis	-3255.931	530.226	-6.141	0.000	0.000
	SWD-N-SWD-Y	657.045	633.185	1.038	0.299	1.000
	Pre-SWD-No-Dis	-2057.076	345.044	-5.962	0.000	0.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
 Asymptotic significances (2-sided tests) are displayed. The significance level is .050.
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.