

Faculty Member Descriptions of Universal Design for Learning (UDL) in
Higher Education Online

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Abstract

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Despite growing emphasis on inclusion in higher education online, research on faculty awareness, implementation, and support for Universal Design for Learning (UDL) remains limited. This study used qualitative data from a focus group with three faculty members in higher education who taught online to address the following research questions:

1. How do faculty members in higher education describe Universal Design for Learning (UDL) in courses online?
2. How do faculty members in higher education describe adding UDL in their courses online?
3. What challenges do faculty members in higher education encounter when it comes to UDL?
4. How do faculty members in higher education describe UDL-related resources?

The literature review explored key concepts and past studies on online learning formats and the common technological challenges faced by faculty. It also examined Universal Design for Learning (UDL), developed by CAST, which includes the principles of Engagement, Representation, and Action & Expression for accessible, inclusive learning. Key terms explored included Equity, Diversity, and Inclusion (EDI), Self-Determination Theory (SDT), and Web Content Accessibility Guidelines (WCAG) to fill a gap in the literature.

Findings showed that consistent with existent research, faculty members apply UDL strategies, especially Action & Expression, without formal training or awareness. Participants expressed a need for clearer institutional guidance and discipline-specific support to implement UDL more effectively. The study resulted in a proposed model for UDL support at the macro and micro levels using EDI, SDT, and WCAG in tandem with UDL.

Generative AI Disclosure

ChatGPT-4o was used to assist in this thesis in ethical ways through transparency and mitigation methods.

1. Find sources (all sources were then verified in Google Scholar by downloading and reading the articles).
2. Format sources in APA style (manual check was then performed to assure accuracy compared to the [APA website](#)).
3. Edit text, grammar, punctuation, wording (every sentence was read multiple times and tweaked/adjusted to reflect desired tone).
4. Clean up transcript (the transcript from the interview was dense with timestamps, extra spacing, uhms, uhs, and stuttering, this was corrected using AI then confirmed by myself and the participants).
5. Enhance my thesis (No mitigation was needed. Appendix S contains the prompt used and the list of recommendations).
6. Explain ontological and epistemological stances simply when researching coding and thematic analysis, which lead me to understanding constructivist approaches (Appendix T contains the prompt used and the explanation. Academic sources that corroborated the explanations were then sought out and read).

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Chapter 1: Introduction

Universal Design for Learning (UDL) is a framework that reduces barriers to accessibility and inclusion by offering students the flexibility of choice throughout the learning experience (Anderson & Angelo, 2022). Although abstract sounding, UDL is action oriented. It is a way of designing, creating, delivering. “Universal Design is not about buildings, it is about building – building community, building better pedagogy, building opportunities for agency. It is a way to move,” (Dolmage, 2017, p. 118). UDL research is important because it focuses on individuality, inclusion, autonomy, and communication (CAST, 2024).

UDL History

In the early 1990s, researchers at the Center for Applied Special Technology (CAST) began formulating UDL, recognizing that traditional teaching methods did not support the needs of all students (Rose & Meyer, 2002). In 1998, CAST published *Universal Design for Learning: Theory & Practice* which outlined the three fundamental principles behind UDL: Multiple Means of Engagement: Motivating learners in different ways and Multiple Means of Representation: Presenting information in different formats. Multiple Means of Action & Expression: Allowing students to demonstrate knowledge in various ways (CAST, 2024). The complete list of principles and guidelines appears in Appendix A. UDL stems from Universal Design, which was influenced by the barrier-free movement of the 1950s, and the Civil Rights Movement of the 1960s (Rose & Meyer, 2002). These changes in public policies and design practices inspired Disability Rights laws in the 70s, 80s, and 90s (Story, Miller, Mace, 1998). Story, Miller, and Mace (1998) wrote that these laws prohibit discrimination and “provide access to education, places of public accommodation, telecommunications, and transportation,” (p. 16). More recently, building on the previous *No Child Left Behind Act* (Almeqdad et al., 2023), the *Every Student Succeeds Act (ESSA)* (U.S. Department of Education, 2015), a new education law was passed promoting equity in learning environments and “intending to decolonise the research conducted in English speaking countries” (Almeqdad et al., 2023, p. 17; Datta, 2018). Furthermore, the revision of the U.S. Federal law Section 508 in 2018 aligned itself with the Web Content Accessibility Guidelines (WCAG), to mandate that all electronic information be accessible (U.S. General Services Administration, 2018).

Similarly, in Canada, since 2019, the Accessible Canada Act states that all web content should be accessible to everyone (Government of Canada, 2019). The common purpose of these initiatives is to create accessible and inclusive environments. An “‘accessible’ environment means that individuals with a variety of disabilities can operate it as it was designed to be used, ‘usable’ means everyone can effectively perform its functions, and ‘inclusive’ means it has flexible features so that people with a wide variety of characteristics can use the same product” (Burgstahler, 2020, p. 6). For learning materials to be accessible, certain technical requirements are needed, for example, compatibility with screen readers, easy navigation with a keyboard, transcripts and closed-captions for videos and audio files, and enough visual contrast that someone with low-vision still perceives it properly (Badge et al., 2008; Hashey & Stahl, 2014;

CAST, 2024). For them to be inclusive means that the content is sensitive to principles of engagement, belonging, community, collaboration, acceptance, and welcoming interests (Ortiz et al., 2020; CAST, 2024). Kozleski (2020) states that inclusive education means planning ahead with purposeful implementation to achieve meaningful progress for all students. Inclusion in organizations means creating a sense of belonging, helping people recognize or identify with the presented people or materials through gender, age, ethnicity, ability, and orientation (Mor Barak, 2016). In government or corporations, this can mean ensuring representation throughout the different heads of departments (CCOHS, 2024). In media, this can mean showing diversity throughout the cast and characters and presenting multiple perspectives (Luther et al., 2024). In education, this means fostering a sense of belonging and community by including the students in allowing them to make choices on topics or projects, being representative when using literature or teaching the history and origins of all subjects, ensuring course materials are easy to use by anyone, regardless of any preferences or abilities, (Rao et al., 2015; Burgstahler et al., 2020; Wang et al., 2021) amongst many other possibilities. UDL is shown to have positive impacts and benefits on academic environments (Burgstahler, 2020; Kozleski, 2020; Doll et al. 2021; Flanigan et al. 2023; Kirsch & Luo, 2023). For example, in Ontario, Canada, the Higher Education Quality Council of Ontario (HEQCO) released a 2023 report emphasizing the benefits of UDL for all postsecondary students. The report identified a slow institution-wide implementation of UDL and recommended establishing UDL as institutional policy, facilitating faculty and staff development, and evaluating UDL uptake and outcomes to monitor progress (Courts et al., 2023). Similarly, a 2024 study by Redstone and Luo (2024) detailed the redesign of an online computer science course using UDL principles, demonstrating improved learner engagement and accessibility. UDL can “proactively design instruction for learner variability, improve pedagogy, and diminish barriers for all students in higher education,” (Kirsch & Luo, 2023, p. 17). These initiatives show progress towards supporting faculty members to implement UDL in their courses, yet limited examples currently exist of actual UDL implementation in higher education (Kumar & Wideman, 2014; Schreiner et al., 2024; Meng et al., 2024). According to Rao et al., (2015), UDL is one of three models that adapts Universal Design principles for curriculum creation and education, the other two being Universal Instructional Design (UID) and Universal Design of Instruction (UDI). Table A1 in Appendix B lists the main principles of each of the models, showing clear overlaps between the principles in three concepts: sense of belonging, autonomy, and clear, consistent communication (Rao et al., 2015). These non-prescriptive models for designing inclusive learning environments are broad, leaving room for faculty members to adapt them to fit the instructional design of their courses (Rao et al., 2015).

UDL Ideology

Universal Design for Learning (UDL) is also broad in the sense that it can be applied at many organizational levels. At the highest level, UDL can be implemented systemically in the government, in the department of education, through social-justice initiatives (Zhong & Shetty, 2021). For example, Zhong and Shetty (2021) developed a program called Blueprint for the government of Canada that encouraged equity, diversity, and inclusion (EDI) in planning career paths with Canadians, ensuring equitable salary and working conditions, and helping labourers find work within

companies with EDI values (Zhong & Shetty, 2021). Culture Ally (2024) explains that EDI, DEI (Diversity, Equity, and Inclusion), DEIB (Diversity, Equity, Inclusion, Belonging), and more recently, JEDI (Justice, Equity, Diversity, and Inclusion), and IDEA (Inclusion, Diversity, Equity, and Accessibility) are all similar acronyms that represent the different approaches to designing inclusive and equitable environments where people feel like they belong, are valued, and can access all amenities or features available. These acronyms can be used in combination or interchangeably depending on the needs of the organization (Culture Ally, 2024). This research study will use EDI as an acronym because, as Culture Ally (2024) puts it, Equity is the systemic (or highest level) of accessibility. Research efforts began with Diversity and Inclusion (often with a capital D and I for emphasis) and focused on increasing representation in organizations and businesses, however, a broader view of the issues made researchers realize that under-representation was part of a larger systemic issue. This is when the core concept of Equity was introduced, to wrap itself around the principles of diversity and inclusion as a systemic approach to justice (Culture Ally, 2024; Dewidar et al., 2022a) For precision, this study will use DEI instead of EDI only when quoting or referring to an article or initiative that refers to itself as DEI.

What is common to all of these acronyms is the direction towards social justice. Tuck and Yang (2012) wrote that social justice is the future of education. It is not just a discipline within the field, it “is the field” (p. 5). Furthermore, they emphasized that there is no education without attending to social, historical, and contemporary structures (Tuck & Yang, 2012). A survey on EDI at Canadian universities showed that EDI initiatives can reinforce community engagement, research, teaching and learning, and governance (Universities Canada, 2019). In an article on inclusion in Canadian schools, Dei and James (2002) wrote that inclusion and exclusion in educational institutions responsible for setting collective standards of personal growth are linked to equity and success. These words invoke the notion of policies, practice, and dominant communities, and involve transforming the system of education into one that is accepting of individual differences and collective and historical experiences (Dei & James, 2002). Although some educational establishments have documented EDI initiatives and make efforts to make all students feel welcome, there is still not a lot being done at the greater institutional level to make changes to traditional education (Dei & James, 2002; Burgstahler, 2015; Burgstahler, 2020). Furthermore, there is not a lot of evidence that these efforts have any effect on performance or deep learning (Rosa et al., 2025). However, recent research shows that psychological theories and constructs assist in comprehending the mechanisms behind the benefits of initiatives such as UDL (Ismailov & Chiu, 2022; Rosa et al., 2025). Intrinsic motivation is studied extensively as one of the psychological underpinnings of learning and competency (Fischer, 1978; Deci & Ryan, 1985), which is the core concept behind Self-Determination Theory (SDT) (Ryan & Deci, 2000). Based on psychological research and empirical data, SDT provides a theoretical basis for understanding the factors and reasons why learning occurs when UDL guidelines are followed during course design (Ismailov & Chiu, 2022; Rosa et al., 2025). It is suitable as a method of evaluating how adding UDL in courses caters to diversity and inclusion and “examine engagement in asynchronous online courses” (Ismailov & Chiu, 2022, p. 5). A study with 225 student participants in Japan, Ismailov and Chiu (2022) found that UDL implementation was effective at

satisfying criteria for autonomy and competency, but “it did not fully satisfy students’ needs for relatedness” (p. 11). Similarly, a study with 109 university students in the U.S. showed an indirect effect on deep learning both with autonomy and competence but not relatedness (Rosa et al., 2024). On the contrary, Montgomery and Snow (2024) found that lack of communication with other students and opportunities for connections were factors that affected students’ motivation and ability to learn in a case study in Ontario. Ryan & Deci (2000) found self-motivation to be a common factor in educational success, and through empirical testing, identified three needs for self-motivation, optimal functioning, growth, integration, social-development and personal well-being. These needs are autonomy, competency, and relatedness (Ryan & Deci, 2000). Ryan & Deci, (2000) said:

Research on the conditions that foster versus undermine positive human potentials has both theoretical import and practical significance because it can contribute not only to formal knowledge of the causes of human behavior but also to the design of social environments that optimize people's development, performance, and well-being. (p. 68)

Likewise, the CAST (2024) website states that whether in life, the workplace, or in educational settings, learning experiences should be thoughtfully designed to eliminate barriers and enhance strengths because we all deserve the opportunity to thrive and grow. SDT theorists Ryan & Deci (2000) echo this sentiment in stating that humans are at their most representative of themselves when they are self-motivated, curious, and vital. When they are “inspired, striving to learn; extend themselves; master new skills; and apply their talents responsibly” (p. 68). Furthermore, they state that SDT is concerned, not only with positive tendencies, but also with identifying and examining antagonists in the social environments that “thwart the three basic psychological needs” (Ryan & Deci, 2000, p. 69). Equally, UDL is not concerned only with promoting positive actions and behaviours towards accessible and inclusive environments, three of its guidelines are direct indications to reduce barriers in specific elements such as guideline 7.4, address biases, threats, and distractions, 2.4, address biases in the use of language and symbols, and 5.4 address biases related to modes of expression and communication (CAST 2024). The idea is that removing barriers to learning leads to competency, and competency is sustained by feelings of autonomy (or self-determination), and relatedness (Ryan & Deci, 2000). First through laboratory experiments and then field studies of various kinds, Ryan & Deci (2000) studied the effects of social-contextual events such as feedback, rewards, or communication on intrinsic motivation and found that these actions conduce feelings of competence. However, interestingly, early studies on motivation show that competence is not felt fully and does not enhance the experience of intrinsic motivation unless it is directed autonomously (Fisher, 1978; Ryan, 1982). A person has to attribute their own competence to an internal locus of control for their intrinsic motivation to be evident (deCharms, 1968; Ryan & Deci, 2000). This emphasizes the significance of autonomy and choice in the design of courses and course materials. Research also supports this notion. For example, in the mid-1960s, Rotter’s locus-of-control theory (1960 & 1966) posited that providing students with choices in their learning experiences increased their sense of self control (Rotter, 1960; Rotter, 1966), however, Deci and Ryan’s Self-Determination Theory (SDT) (2000) criticizes this perspective, calling it limited, as

their Cognitive Evaluation Theory (CET), a sub-theory of SDT, effectively showed through empirical evidence that control (or autonomy) alone is insufficient for intrinsic motivation, and that feelings of competency are needed to accompany the sense of control (Ryan & Deci, 2000). In fact, the 1960s to 2000s were a ripe time for change and critique of educational norms as student choice (deCharms, 1968), competency (Deci, 1981) and belonging (or relatedness) (Deci & Ryan, 1985) show impacts on intrinsic motivation, which in turn has powerful psychological and physical benefits (Brickman, 1987; Dember, Galinsky, & Warm, 1992; Fovet, 2020). Likewise, Glassner's *Choice Theory in the Classroom* (1998), first published in 1986 as *Control Theory in the Classroom* (1986), discusses the many psychological benefits of student choice such as increased motivation, sense of ownership and responsibility, enhanced self-esteem through self-worth brought by decision-making, improved learning outcomes, and greater engagement when students can select tasks that interest them and be involved in the process of developing the learning experience. In 2010, Glassner (2010) performed a study to test his theory where students were given assignments and tasks based on their choices and interests. The conclusions showed that involvement, interest, responsibility, and ownership reduce behaviours like absenteeism, lack of motivation, and dropping out (Glassner, 2010). In a survey by Boothe et al. (2020) asking students how they felt about new course implementations such as choosing their own subjects and how they would present, "the results of the study [...] found that students enjoyed having choices in how they demonstrated their understanding of the content that was learned in the class," (p. 14). Similarly, a 2022 study by Coyne and Woodruff, found that giving choices improves student engagement, relevance, and potentially reduces stress (Coyne & Woodruff, 2022).

UDL can be used to adapt in-person courses, however, there is a focus on digital learning and accessibility within its guidelines (Bray et al., 2023). Choice and autonomy can exist through choosing topics, interests, and multi-modes according to CAST (2024), yet it can also exist through the facilitation of assistive technology use (Bray et al., 2023). This means that students using software that reads the text on their screen out loud (called screen readers) or using their keyboard solely without relying on mouse input, can equally access the content, just like any other student would (Burgstahler, 2015; Bray et al., 2023; CAST, 2024). Likewise, according to WCAG Guideline 1.1.1 (World Wide Web Consortium [W3C], 2018) students should be given choices and control in their learning environments by offering text alternatives for any non-text content. Through its three principles, Representation, Engagement, and Action & Expression, UDL can be implemented using the same methods and ideas as Equity, Diversity, and Inclusion (EDI), Self-Determination Theory (SDT), and Web Content Accessibility Guidelines (WCAG). Similar to EDI (Zhong & Shetty, 2021), the UDL principle of Representation ensures students be exposed to diverse perspectives and cultures but also can receive the course materials in a variety of modes. Furthermore, Representation promotes the building of knowledge and comprehension through simplifying, decoding, and scaffolding information to make it easier to understand and ensure students feel competent throughout the learning process (CAST, 2024). Like SDT (Ryan & Deci, 2000), the UDL principle of Engagement ensures students feel welcome in the learning environment, are part of a community of learners, can take advantage of their own interests by having autonomy in the subjects they learn and how

they learn them, and develop competency through purposeful goal making and awareness of self and others (CAST, 2024). In contrast, the UDL guideline of Action & Expression aligns with WCAG (World Wide Web Consortium [W3C], 2018) in that it ensures students have the freedom to access the learning materials using assistive technologies (CAST, 2024).

To summarize, UDL research is important because studies show it has a multitude of benefits for students (Burgstahler, 2020; Kozleski, 2020; Doll et al. 2021; Flanigan et al. 2023; Kirsch & Luo, 2023), but also because applied at a broader scale, it can cast its benefits on a wider net of people. UDL can be utilized for designing inclusive and accessible learning environments and materials in combination with similar frameworks such as Equity, Diversity, and Inclusion (EDI) (Zhong & Shetty, 2021), an approach to justice that can be applied systemically, Self-Determination Theory SDT, a widely supported theory that explains the psychological underpinnings of UDL (Ismailov & Chiu, 2022; Rosa et al., 2025), and practical implementation guidelines for accessible content such as the Web Content Accessibility Guidelines (WCAG) (World Wide Web Consortium [W3C], 2018).

UDL Responsibility

Faculty members in higher education are valuable stakeholders who have a responsibility to ensure that course materials and environments respond to accessibility and inclusivity criteria (Altowairiki, 2023; Mulla et al., 2023). They are often hired as content knowledge experts but rarely have training in online pedagogy or accessible and inclusive course design strategies (Izzo et al., 2008; Brownell & Tanner, 2012; Burgstahler, 2022). Despite this, it is nonetheless up to the faculty members themselves to design the learning environment and atmosphere (online or in-person), assignments, projects, course materials, and assessments, that the students will interact with (Altowairiki, 2023). Although, traditionally, they were considered the *sage on the stage* (King, 1993, p. 30; Mulla et al., 2023), in online learning they are often referred to as the *guide on the side* (Mulla et al., 2023). In fact, some research shows that there is a trend towards pedagogical models that put the onus on students for their own learning experience, and place faculty members in the role of facilitators (Blumeberg, 2009; Smart et al., 2012; Hanewicz et al., 2017). Not all faculty members develop course materials, some only deliver them (Altowairiki, 2023) and universities often dictate the terms of course offerings such as in-person, hybrid, or online (Salama & Hinton, 2023), yet it is the faculty member's responsibility to ensure their course is accessible and inclusive (Altowairiki, 2023).

The responsibility of designing, creating, modifying, and implementing course materials to be accessible and inclusive is not an easy task. In the past, faculty members used to work alone to create their courses, however, heavy workload, lack of time, and lack of knowledge of online pedagogy and the associated technologies led them to work more closely with professionals in education called instructional designers (Chen & Carliner, 2021). Despite this expert assistance, there still exists a number of challenges related to UDL awareness and implementation faced by faculty members in higher education (Rao et al., 2015; Burgstahler, 2020; Chen & Carliner, 2021; Altowairiki, 2023). It often requires a fundamental change in attitude, perspective, and ideology

behind evaluating student performance as well as technical knowledge (Krug et al., 2016; Bhat & Geelani, 2018)

UDL Challenges

Although UDL principles are not new, there is still a documented lack of awareness of UDL and its principles throughout the higher education system (Smith Canter et al., 2017; Mavrovic-Glaser, 2017; Hills et al., 2022; Altowairiki, 2023; Mulla et al., 2023). For example, a 2023 qualitative case study in a Canadian university's graduate program explored the development of online courses and the faculty members' capacity to incorporate UDL. The findings identified faculty challenges such as lack of knowledge, traditional mindsets, and time constraints that impede UDL implementation (Altowairiki, 2023). Faculty members having little to no knowledge of UDL is identified as one of the main barriers to implementation (Rao et al., 2015; Burgstahler, 2015; Westine et al., 2019; Burgstahler, 2020; Hills et al., 2022). However, interestingly, research shows that some faculty members implement UDL even with no knowledge of it (Izzo et al., 2008; Mavrovic-Glaser, 2017; Hills et al., 2022). In terms of implementation of UDL in online environments, not knowing about it, and lack of time (Mulla et al., 2023), the technical and online aspect is also a recurring challenge (Burgstahler, 2020). The revision of Section 508 (2018), the Accessible Canada Act (2019), and the COVID-19 pandemic, which forced thousands of unsuspecting faculty members to suddenly teach online (Pérez-López et al., 2021; Mulla et al., 2023), disrupted the daily tasks of course development (Turnbull et al., 2021). The pandemic pushing so many universities to teach online also revealed structural weaknesses in institutions related to digital equity and faculty preparedness for online teaching (Pérez-López et al., 2021). Even if online learning was already an established model, the pandemic facilitated a shift to fully online education (Meng et al., 2023). This shift to a demand in online learning created significant challenges for administration, instructors, and students, in making accessible environments (Burgstahler, 2020; Pérez-López et al., 2021). Not only did COVID-19 accelerate the shift to fully online education (Meng et al., 2023), it amplified the students' desire to remain online (Irhouma & Johnson, 2022). A 2022 National Survey Report of Canadians on digital learning with 169 participants across 91 Canadian institutions reported a sustained demand for online and hybrid classes, even as the pandemic ended, and in-person classes resumed. The findings of the survey suggest that online learning is still a preference for many students, even post-pandemic (Irhouma & Johnson, 2022). This underlines the need for more accessible and inclusive online course designs (Burgstahler, 2023; Schreiner et al., 2024). Despite its benefits, the integration of UDL in online higher education courses is still limited (Kumar & Wideman, 2014; Schreiner et al., 2024; Meng et al., 2024). The problem is that faculty members play a crucial role in developing courses yet a great number of them do not know how to effectively put courses online that respond to accessibility and inclusivity standards (Mavrovic-Glaser, 2017; Lowrey et al., 2017). Where curriculum and assessment design have dominated their role for ages suddenly, making courses available online, technical accessibility, and recreating the same feeling of belonging as in the classroom environment have become paramount (Altowairiki, 2023).

UDL Support

Lowrey et al. (2017) demonstrated in their study that faculty members in higher education lack awareness in UDL and its concepts and are underprepared for the diversity of learners in today's classrooms. However, studies show that with proper training and information on best practices, they can incorporate UDL principles into their courses (Mavrovic-Glaser, 2017; Smith Canter et al., 2017; Burgstahler, 2020). In a 2022 study on faculty member perspectives on UDL in higher education, Hills et al., (2022) reported that offices such as centers for teaching and learning at universities and centers for disabled students were the most commonly identified resources for support on UDL. Information from colleagues and scholarly literature were also listed as common methods that faculty members used to gain awareness of UDL (Hills et al., 2022). There is a surprisingly low amount of formal academic research studies on EDI or UDL-initiatives or support within the Canadian government however, there are documents and resources that can be found online for public consumption. In Canada, the Fonds de recherche du Québec launched a Diversity, Equity, and Inclusion (DEI) strategy involving all higher education institutions in 2021, which they revised in 2024, with the vision to achieve a research ecosystem whose strength lies in equitable and inclusive practices, a diversity of people, perspectives, methodologies and research questions, and diverse and inclusive models of excellence (Fonds de recherche du Québec, 2024).

Furthermore, the official government of Canada website provides a [Digital Accessibility Toolkit](#) (Government of Canada, n.d.) with learning materials, resources, and tips and tricks to implement accessibility in digital projects. It does not specifically target faculty members, however, there is a section called [Design a Course with Do's and Don'ts for developing online courses](#), writing and development tips, a section on personas and one page on [Universal Design for Learning \(UDL\)](#) (Government of Canada, .n.d.). The Quebec government hosts a website with resources for teachers in French called [Conception universelle de l'apprentissage](#). The Government of Alberta issued a one page public PDF document about [Making Sense of Universal Design for Learning](#). When it comes to online educational materials, websites like [Learn Quebec](#), and [Inclusive Education Canada](#), provide resources for creating accessible learning experiences, while the [Aristotle Foundation for Public Policy](#) uses scientific research to help prospective faculty to make informed choices by ranking Canadian Universities based on their level of EDI implementation (Hunt et al. 2025). At the institutional level, higher education institutions in Canada such as [Concordia University](#), [McGill University](#), [Dawson College](#), [University of Toronto](#), [University of British Columbia](#), have all adopted UDL-related practices and provided support through a variety of initiatives. Within these institutions, there are access centers for students with disabilities, and centers for teaching and learning where faculty members can get support from professionals such as instructional designers (IDs) who are experts in designing accessible and inclusive courses (Chen & Carliner, 2021; Wang et al. 2021).

Despite these efforts, in a survey of 205 faculty members, results showed they felt that lack of formal, nationwide, institutional policy on UDL produced inconsistent awareness and implementation throughout universities (Hills, et al., 2022).

Research Problem

This study seeks to explore faculty members in higher education's descriptions of UDL, experiences with UDL in online courses they taught, identify challenges to its awareness and implementation, and investigate existing and needed resources for supporting them.

Faculty members in higher education face challenges in awareness and implementation of Universal Design for Learning (UDL) (Hills et al., 2022; Burgstahler, 2020; Wang et al., 2021; Altowairiki, 2023) as well as accessing UDL-related resources to support them when developing online courses (Lowrey et al., 2017; Smith Canter et al., 2021; Robinson & Wizer, 2016). Despite the increasing emphasis on inclusive education, there is limited research on how faculty perceive and describe UDL, what they have done to add UDL to their courses (Izzo et al., 2008; Kumar & Wideman, 2014; Schneider et al., 2024; Meng et al., 2024) what challenges they encounter (Hills et al., 2022; Altowairiki, 2023), and what support systems or resources effectively assist with awareness and implementation (Robinson & Wizer, 2016; Burgstahler, 2022; Burgstahler, 2023).

Research Questions

Qualitative data from a focus group interview with three faculty members in higher education who have taught courses online has been used to answer the following research questions:

1. How do faculty members in higher education describe Universal Design for Learning (UDL) in courses online?
2. How do faculty members in higher education describe adding UDL in their courses online?
3. What challenges do faculty members in higher education encounter when it comes to UDL?
4. How do faculty members in higher education describe UDL-related resources?
 - What UDL-related resources do faculty members in higher education describe using?
 - What additional measures can be introduced to support faculty members in higher education to gain knowledge about UDL?
 - What additional measures can be introduced to support faculty members in higher education to add UDL in their courses online effectively?

Research Objectives

This research aims to explore faculty members in higher education's perceptions, knowledge, and experiences with Universal Design for Learning (UDL) in online courses with the purpose of identifying the challenges they face when gaining awareness of or implementing UDL in online courses. Through examining faculty members knowledge of existing UDL or UDL-related resources, this study seeks to discover what their needs are regarding support for awareness and implementation of UDL.

Another aim is to add to the broadening collective research on UDL in higher education. At the start of this master's thesis in 2020, very few research studies could be

identified in Google Scholar where faculty members were being interviewed about their experiences with UDL, however, by the time of the final thesis in 2025, an increasing number of studies exist. This study, due to its small sample, cannot be generalized to a broader population, however, insights from this study can be confirmed through replication with similar populations, and help inspire further research on UDL in higher education online.

Finally, this study also attempts to address the gap in literature that exists in the overlap between UDL, EDI, WCAG, and SDT. After extensive research through Google Scholar, ERIC, Jstor, Google, Researchgate, and ChatGPT, it was concluded that these four concepts have been studied extensively apart – EDI (Dewidar et al., 2022a; Dewidar et al., 2022b; Iniesto & Bossu, 2023), UDL (Meyer et al., 2014; Rao et al., 2015; Smith Canter et al., 2017; Schreiner et al., 2024), SDT (Deci & Ryan, 1985; Ryan & Deci, 2017; Ryan & Deci, 2000), WCAG (Reid & Snow-Weaver, 2008) and somewhat in pairs (Burgstahler, 2020; Ismailov & Chiu, 2022; Rosa et al., 2025), however, all four do not appear to overlap in the current literature.

Chapter 2: Literature Review

This chapter presents the literature that informed this research study and the research questions. The section on Universal Design for Learning (UDL) in Online Courses focuses on describing and contextualizing UDL within the existing literature, by dissecting each word of its name and then defining it in detail. The next section defines the important terms used in this study to ensure proper understanding and context. The last section, Faculty Experiences with UDL, investigates numerous existing studies on UDL in higher education regarding faculty member awareness, implementation of UDL, and faculty support needs.

Universal Design for Learning (UDL) in Online Courses

To organize this section, the wording of Universal Design for Learning in Online Courses is dissected in three parts, Online Courses, Universal, and Design for Learning. Then, Universal Design for Learning (UDL) is defined in more detail.

Online Courses

Fernandez et al., (2022) define online learning as either synchronous, asynchronous, or blended. Synchronous online learning refers to “live” sessions where faculty members and students are present at the same time in a learning session or environment (Fernandez et al., 2022) such as Zoom or Teams, or using live-polls and timed forum-responses. Asynchronous online learning, contrarily, refers to learning materials that can be accessed at either specific or unspecific times, but where no faculty or student presence is emphasized. Blended learning refers to courses that combine both methods in one learning experience (Fernandez et al., 2022).

What is meant by the learning materials being accessed at specific or unspecific times, is that, even without live faculty intervention, through the websites that course materials are displayed on, it is possible to display the content in a specific time frame. This is referred to as gating, and means that certain content is ungated, or unlocked, either at certain times, or when certain conditions are met (Ng et al., 2021). How this is set up is on a website. The specific type of website used for online learning is referred to as an LMS, or a Learning Management System (Ng et al., 2021; Turnbull et al., 2021). There are many different LMSes available, each with its own features where media, files, and interactive components such as discussion forums and quizzes can be hosted place (Veluvali & Suriseti, 2021; Turnbull et al., 2021). This study will not delve into those details, but to properly define online courses, it is important to understand the platforms on which it normally takes place. One of the main reasons is because technical aspects of online learning are challenges for faculty members and many of those challenges stem from ensuring the documents and course materials in the LMS are accessible (Yeh & Tsai, 2022).

Universal

The word universal in UDL refers to universality, usability, and acceptance of all identities, which can be applied as a quality standard of online learning as providing students with choices and a sense of belonging, or inclusion (CAST, 2024). Universal in UDL also does not mean the one-size-fits-all approach. The goal in the course design being *universal* is to create universality through acceptance of individuality, not

sameness. Instead, it emphasizes flexibility and choice by providing multiple ways for students to engage with content, represent information, and express what they know (CAST, 2024).

Design for Learning

This is where *design for learning* is important. Knowing when and where in an online course to balance allowing students to make choices and when to guide them with expertise (Tobin & Behling, 2018). There is significant research that shows that too much choice can have negative consequences, the most prominent of which is overwhelming students (Iyengar & Lepper, 2000; Schwartz et al., 2002; Flowerday & Schraw, 2003; Flowerday et al., 2004; Scheibehenne et al., 2010; Schwartz & Cheek, 2017). Designing a learning experience is a profession in itself, it is not something that most faculty members in higher education are familiar with (Chen & Carliner, 2021). Most of them are experts in their own fields, but not in teaching or curriculum design (Kumar & Ritzhaupt, 2017). As a profession, it exists through the titles of Instructional Design and Learning Experience Design. Kumar & Ritzhaupt (2017) describe the professionals in this industry, commonly known as Instructional Designers (IDs), as usually holding master's degrees in instructional design or educational technology and being responsible for applying evidence-based methodologies to the design and development of learning materials. They are often experts in learning theory, learning strategies and methods, frameworks such as UDL, and are knowledgeable about learning platforms and authoring tools for creating course materials (Kumar & Ritzhaupt, 2017). Faculty members in higher education and IDs often work together (Chen & Carliner, 2021; Carliner & Chen, 2024) to enhance student experience through varying course delivery methods (Wang et al. 2021; Hills et al., 2022). Designing a learning experience with UDL in mind requires implementing strategies from the beginning of the course conception, through to making the course materials, and formulating the evaluations and assessments (Burgstahler, 2020, Hills et al., 2022). This seems like a lot of changes to make all at once, however, UDL comes with a built-in stress-free mechanism called the Plus-One approach. This promotes modifying, developing, and adapting course content iteratively, one step at a time, and not attempting to re-craft, or redesign entire courses or programs all at once (Tobin & Behling, 2018).

Universal Design for Learning in Detail

Universal Design for Learning (UDL) is a framework adapted from Universal Design that can be applied to learning environments and materials that makes them accessible and inclusive (CAST, 2024). Universal Design began with physical accommodations, with establishments using curb cuts, wheelchair ramps, and braille on elevator buttons (Rao & Tanners, 2011). More recently, the idea behind Universal Design has merged into the educational and digital space by the Center for Applied Special Technology (CAST), who developed UDL (CAST, 2024). CAST was founded in the 1980s by researchers Meyer, Rose, and Gordon who focused on exploring learning technologies as alternatives to print (Meyer et al., 2014), the most widespread teaching material at that time (Jiménez et al., 2007). CAST then shifted their focus to embrace curriculum design in the 1990s (Orkwis & McLane, 1998) and in 2008, categorized the nine UDL guidelines into three principles, and issued the Graphic

Organizer for UDL (CAST, 2024). CAST made UDL simple to follow by creating a table that shows the standards divided into nine guidelines. These three guiding principles are (1) Engagement, (2) Representation, and (3) Action and Expression (CAST, 2024). UDL is an approach for developing course materials and content that benefit students without requiring adaptations or retrofitting, meaning that students do not need to ask for a version of the content that they are able to perceive (Tobin & Behlin, 2018). This is important because so much emphasis has been put on adapting content for people with disabilities, creating centers for students with disabilities, and focusing on retrofitting course content, but UDL emphasizes a course design approach that not only is accessible from its conception, but also suits everyone, without focus on people with disabilities (CAST, 2024). This has positive effects on students with disabilities because research shows that they do not want their disability brought to attention. UDL ensures that course materials are accessible from the start so a student with a disability does not even need to disclose it to anyone. They can use the course materials and perform the activities necessary like anyone else (Tobin & Behlin, 2018). Tobin and Behling (2018) said that “UDL is a way of thinking about creating the interactions that we have with our learners so that they do not have to ask for special treatment, regardless of the types of barriers they may face” (p. 130). According to CAST (2024), “there is no average brain” (p. 1), therefore UDL exists to empower each individual, so they have agency over their learning. Fornauf et al. (2020) explained that “the framework is built on the premises that (a) there is systematic variability among learners, (b) learning is equal parts cognitive and emotive, and (c) the networks of the brains engage, process, and represent information in different ways for different people” (p. 183). It is interesting to note that on July 30, 2024, the UDL guidelines version 3.0 were released, where the language was updated to be simpler and easier to understand, and the perspectives of practitioners and scholars whose experiences had not previously been recognized was included to address biases in the earlier versions (Readability Matters, 2024). CAST wrote on their website in a section on who the guidelines are for that:

Guidelines 3.0 shifted from educator-centered to learner-centered language in order to emphasize the notion that the Guidelines can be applied by educators and learners alike. This current version intentionally uses verbs that can be used interchangeably among and between educators and learners to spark flexibility and creativity in ways to apply the Guidelines. Depending on the learning goal, educators, learners, or educators and learners together might apply specific guidelines (CAST, 2024).

Both version 2.0 and version 3.0 of the guidelines are included in Appendix A because this study was started using the older guidelines but is ending in the era of the new guidelines, and this shows the evolution of CAST, and how they are implementing their own guidelines by becoming gradually more inclusive.

UDL a set of actionable tasks with applicable recommendations. Each guideline contains a short description of what it means to respond to the principle and then lists ways practical ways to apply it. Within the scope of this literature review, it is not possible to go through all of the UDL recommendations. Table A2 in Appendix C focuses on three examples, one from each UDL principle, related to adding “student

choice” or being “inclusive”, to stay connected with the over arching themes of this literature review. As can be noticed from the substantial number of recommendations, implementation can be challenging. However, a number of experts believe that UDL application is not a one-step process (Tobin & Behling, 2018; Fornauf & Erickson, 2020; Kirsch & Luo, 2023), it is an iterative and on-going process of improvement to a course “based on the changing needs of students” (Kirsch & Luo, 2023, p. 18). Research recommends making small changes over time, instead of trying to re-design the entire course or program at once (Fovet & Mole, 2013; Westine et al. 2019; Kirsch & Luo, 2023). This is often referred to as the Plus-One Approach. To better grasp the Plus-One Approach concept, Tobin and Behling (2018) tell a story that illustrates it well. To summarize their story, when a UDL expert spoke at a conference with faculty members in higher education, he met a woman who was excited to tell him that she spent an entire week with her teaching assistants making *all* of their history course accessible. The expert asked her how she felt about it and the faculty member responded that her and her assistant were exhausted, and they weren’t even sure if it was worth it but that, “*it’s the law*” (Tobin & Behling, 2018). Too often, Tobin et Behling (2018) remarked, faculty members and instructional designers spend a lot of time making documents accessible to the point of exhaustion, without taking the time to reflect on which parts would best be served with alternative versions. Furthermore, too often faculty members assess the enormous amounts of potential changes to a course that can be made to make it align with UDL guidelines and they find it overwhelming. Adopting the Plus-One Approach with UDL promotes first identifying the problem areas with learners and addresses those needs first (Tobin & Behling, 2018). As the CAST (2024) website explains in the Frequently Asked Questions as an answer to whether all guidelines need to be applied at once to be faithful to the framework:

In fact, some guidelines or considerations may not be relevant to certain learning goals. The first step in applying the UDL framework to practice is to define a specific, challenging learning goal. This clarity will allow you to strategically mix and match guidelines and considerations (CAST, 2024).

The expert recommendation when developing a new course is offering one alternative method and then paying attention to how it goes in order to tweak it in the next iteration of the course delivery (Tobin et Behling, 2018). Boothe et al. (2020), similarly, found that instructors find success in implementation when they “have a starting point to begin utilizing UDL in their classroom and [like knowing] that it is okay to start small” (p. 14).

Defining Important Terms

Universal Design for Learning (UDL) is not alone in its ability to promote accessible and inclusive environments. It aligns with other frameworks such as Equity, Diversity, and Inclusion (EDI), psychological theories of motivation such as Self-Determination Theory (SDT), and Web Content Accessibility Guidelines (WCAG), which give practical rules on making online documentation accessible. It also aligns with other learning methods, theories, and principles, but this study will focus on those exclusively to fit within the scope of this master’s thesis, and to create a hierarchy of information that is easy to understand.

Equity, Diversity, and Inclusion (EDI)

Equity, Diversity, and Inclusion (EDI) initiatives aim to create communities, organizations, and workplaces where people feel valued and respected, and where everyone has equal access to opportunities (Iniesto & Bossu, 2023). EDI rests on its three named principles: Equity: Ensuring fair treatment, access, and opportunities for all people. Working towards identifying and eliminating barriers that have led to underrepresentation and marginalization in the past. Diversity: Valuing and recognizing differences in people, including race, ethnicity, gender, age, sexual orientation, disability, and other attributes. And Inclusion: Designing environments where everyone feels welcome, valued, respected, and able to fully participate and contribute (Dewidar et al., 2022a; Dewidar et al., 2022b). EDI is a structured framework, similar to UDL, that is rooted in the civil rights movement of the 1950s and 60s. It was popularized by higher education institutions, where universities put emphasis on diversity in faculty hiring, curriculum development, and student admissions. It then evolved into large organizations and social justice movements (Jimerson et al., 2021).

Self-Determination Theory (SDT)

Self-Determination Theory (SDT) is also beneficial to students but in different way. The theory describes how agency and control within a student's learning environment can increase their motivation (Ryan & Deci, 2000). In 1985, Deci and Ryan published *Intrinsic Motivation and Self-Determination in Human Behavior*, presenting SDT as a theory of motivation with three psychological needs: Autonomy: the need to feel in control of one's actions. Competence: the need to feel effective. Relatedness: the need to feel connected to others (Deci & Ryan, 1985). SDT has been studied and tested through empirical means since the early 80s positing that motivation is cultivated in atmospheres where competency, autonomy, and relatedness are present (Ryan & Deci, 2000). Ryan & Deci (2000) characterize motivation as being moved to do something, as being "energized or activated toward an end" (p. 54). They explain that intrinsic motivation in particular is important for faculty members because it results in creativity and high-quality learning (Ryan & Deci, 2000). In 1985, Deci & Ryan presented the Cognitive Evaluation Theory (CET) in order to discover social factors that influence motivation. They concluded that motivation is not enhanced by learning or competency unless the learner feels in control of their own experience (Deci & Ryan, 1985).

Web Content Accessibility Guidelines (WCAG)

WCAG was first developed in 1999 by the World Wide Web Consortium (W3C), targeting programmers working in coding languages such as HTML and CSS. It aligns with Section 508 of the law to ensure technical accessibility (World Wide Web Consortium [W3C], 2018). In 2008, version 2 of the guidelines was published to introduce the four core principles: Perceivable: Content must be available to the senses. Operable: Users must be able to navigate and use the interface. Understandable: Content and operation must be clear. Robust: Must work with current and future assistive technologies (World Wide Web Consortium [W3C], 2018). The purpose of WCAG is to allow all web users access to the content, regardless of potential barriers. For example, within the first principle, Perceivable, content that is text-based requires an audio

alternative and narrated audio requires a text alternative such as captions or a transcript. These basic accommodations make it possible for people to choose how to access web content in a way that best suits them (Reid & Snow-Weaver, 2008).

Faculty Experiences with UDL

Recent studies on Universal Design for Learning (UDL) higher education online highlight the experiences of faculty awareness, practical implementation strategies, the challenges that go with these, and institutional support needed by faculty members.

Faculty Awareness of UDL

To ensure quality online course delivery, and the best student experience, it is crucial that faculty members be aware of frameworks such as UDL, that can give them practical solutions on implementing accessibility and inclusivity (Tobin & Behling, 2018; Westine et al., 2019). Even if there is traction on UDL implementation worldwide, a number of faculty members are still unfamiliar with UDL and its principles, and mostly, how to concretely apply them (Burgstahler, 2013; Rao et al., 2015; Hills et al., 2022; Kirsch & Luo, 2023). For example, in a survey about UDL implementation in higher education with 93 faculty members, Kirsch and Luo (2023) reported that nearly 13% of faculty surveyed had no prior exposure to UDL. Similarly, Hills et al., (2022) highlighted that only 29.3% of faculty reported having a good or complete understanding of UDL, 38.5% had some understanding, and 32.2% with little to no understanding. A participant in their study responded when asked about UDL awareness in their colleagues:

I don't know if I would have a percentage guess of faculty who have an awareness of what UDL is. I think it's probably somewhere around half. And when I bring it up to faculty who say they have an awareness, and then we talk more, I realize they don't, or it's limited. (Hills et al., 2022, p. 5)

Furthermore, in a survey of 150 faculty members in higher education who taught at least one online course between 2017 and 2018, Westine et al. (2019) found that 28.4% were not familiar with UDL at all, and the others reported some familiarity. Table A3 in Appendix D presents the percentage of familiarity with the guidelines found in the results, with expression and communication (60.3%), perception (59.6%), and comprehension (50.4%), coming in the top spots of faculty familiarity (Westine et al., 2019). In a mixed-methods study done in a Canadian university with faculty members, Hills et al., (2022) found that awareness and knowledge of UDL was identified as the second most important barrier to implementation, as 43% of the faculty members surveyed, out of 205, identified it as a barrier (Barriers will appear in Table A4 of Appendix E). Similarly, Cunningham et al. (2017) and Smith Canter et al. (2017) both found that, apart from lack of time, lack of awareness or knowledge on UDL was its main barrier to implementation. These findings collectively reveal that the level of awareness of faculty members on UDL is uneven and that it is a barrier to implementation. Furthermore, studies suggest that many faculty members think of UDL as an intervention or program, not as an applicable framework that can be implemented to attain specific goals (Fornauf et al., 2020; Dell'Anna et al., 2024), suggesting that there is some lack of understanding.

Faculty Implementation of UDL

Although many faculty members are not necessarily familiar with the specific terminology or frameworks, they often apply UDL guidelines without referring it to UDL (Izzo et al., 2008; Hills et al., 2022). Hills, et al., (2022) stated in a survey study on faculty perspectives on UDL that “while reported understanding of UDL was low, it is possible that faculty unfamiliar with the specific terminology still employ UDL practices” (p.8). Similarly, in a focus group study of faculty member perspectives on UDL, Izzo et al. (2008) found that faculty members could not articulate the definition of UDL but were using the strategies such as providing the lecture notes to the class. One participant said that they wanted their course to be “taught in many different ways” (p. 64), they felt that “students should have to hear it, read it, say it” (p. 64). As Izzo et al. (2008) suggest, this shows some evidence of understanding of multi-modal representation. When faculty members do become aware of the guidelines and have access to UDL resources, UDL implementation can still be difficult due to a lack of clarity for what guidelines mean in practice in higher education (Westine et al., 2019). In a survey study with 205 faculty members in higher education, Hills et al., (2022) transformed the UDL guidelines into more “common” language before asking the participants if they were using UDL in their courses. This made it easier to ensure that participants were not confused by the lack of clarity in the guidelines. The results showed that faculty members used a variety of UDL methods such as posting course materials in advance (74.9%), variety in assessment (71.9%), and varied lecture delivery (66%) (Hills et al., 2022). Table 5 in Appendix F presents the findings. In the same study, one of the participants explained that “the price of textbooks is a UDL issue, the firmness of deadlines is a UDL issue, ensuring equal opportunity to take leadership roles in group work is a UDL issue. So, it’s really quite broad,” (Hills et al., 2022, p. 5). In a survey study with 93 faculty members, Kirsch & Luo (2023) found that many of the UDL guidelines were implemented more purposefully. The results reported that most of the faculty members used one or more guidelines, and many used all nine guidelines. Table A6 in Appendix G details the results. Similarly, in a case study of four participants who implemented UDL in higher education online, the participants used student choice such as allowing them to present using their own ideas and interests, and letting students submit their work and demonstrate knowledge in multiple ways (Oyarzun et al., 2021). One participant said, “if the class is not a writing-intensive course, there is no reason that they need to write me an essay at the end,” (Oyarzun et al., 2021, p. 130). Another participant in the same study assigned large final projects in small stages to generate opportunities for feedback and revision, both from the faculty and from peers. Another participant allowed students to make videos, presentations, or playlists of songs to demonstrate understanding of key concepts (Oyarzun et al., 2021). However, experts noted that such implementations are not common yet in higher education (Redstone & Luo, 2024). The number of potential implementations, the UDL guidelines themselves, and the technology and time it takes to implement them can all seem overwhelming, even for experts (Kirsch & Luo, 2023). Kirsch and Luo (2023) identified a number of challenges to implementation such as lacking time, complexity of the framework, needing training (Access the challenges in Table A7 of Appendix H). This research is consistent with previous studies showing that lack of time acts as a barrier to implementation of UDL (Lombardi & Murray, 2011; Rao et al., 2015; Dallas

& Sprong 2015; Cook & Rao, 2018; Hills et al., 2022). Rao et al. (2015) stated as the result of a study where UDL was implemented in an online course “the effort and time that went into the design, development and implementation of these courses was far greater than an online course in which materials are provided in one format or without multiple and varied options provided” (Rao et al., 2015, p. 49). Tobin et Behling (2018) noted that UDL is a good idea in theory but that faculty members rarely have the time or energy to “reflect on, design, and implement multiform interactions with their learners” (p. 131). However, experts recommend making iterative changes, taking small steps, instead of applying UDL to an entire course or program (Fovet & Mole, 2013; Westine et al. 2019; Kirsch & Luo, 2023), using the Plus-One Approach (Tobin et Behling, 2018).

Faculty Support for UDL

In a study on faculty’s familiarity with UDL guidelines, Westine et al. (2019) stated that for UDL adoption to expand, it would be beneficial to conduct exploratory research that identifies concrete examples of best practices. The study also found mixed levels of understanding are often correlated with the extent of professional development the participant had received on UDL (Westine et al., 2019). Similarly, in a study with 70 faculty members about UDL implementation, Evmenova (2018) emphasized that programs that prepare faculty must specifically incorporate UDL frameworks. The study demonstrated that faculty members who had received targeted UDL training were significantly more effective at implementing inclusive practices into their courses (Evmenova, 2018). A 2023 qualitative case study in a Canadian university’s graduate program explored the development of online courses and the faculty members’ capacity to incorporate UDL. The findings highlighted the role of academic leaders in fostering the adoption of UDL and the need for more support and resources (Altowairiki, 2023). According to a survey study of faculty members conducted by Kirsch & Luo (2023), the most common way faculty members learned about UDL was through conference sessions or workshops, followed by journal articles, internet searches, then word of mouth. In contrast, Hills et al., (2022) found that offices at the university providing training and teaching assistance (30.2%), and centers for students with disabilities (30.2%), were the resources most commonly identified by faculty members in a survey study on faculty perspectives with 205 participants. Scholarly literature was also a popular choice (26.3%), as well as training (18.5%), and conferences (11.2%). Learning from colleagues from the same university was more common (19.2%), than learning from colleagues elsewhere (11.2%). However, in the same study, one participant mentioned that “if you want universal design, you can’t just ask for it, you have to tell people what that means and what that would look like for them,” (Hills et al., 2022, p. 5). This was the result of an interview where multiple participants mentioned inconsistencies, not so much in the knowledge levels of UDL in their institutions, but in implementation. One participant said, “if you don’t have [institutional] guidelines, faculty go back to their own subjective definitions and that’s where we see the inconsistencies” (Hills et al., 2022, p. 5). According to the findings, many faculty members feel that institutional guidance is lacking, and this leads to inconsistency in awareness and implementation (Hills et al., 2022).

Chapter 3: Methodology

This research will use data collected by me on November 19, 2024, during a focus group interview conducted online on Zoom. The interview was recorded, and a transcript was automatically generated and then reviewed by me. The research site for this study is a Canadian higher education institution.

The first section explains the ontological and epistemological stances taken in developing this thesis. The second section explains the recruitment efforts. The third section discusses sampling. The fourth section explores the sample limitations. The fifth section gives details on the desired participants. The sixth section then shows the process of gaining ethics approval and participant consent. The seventh section reviews the focus group interview research methodology used and the reasoning and rationale behind that decision. The eighth section details the data collection, the interview process is described. Then, ninth section goes into detail about data analysis, beginning with inductive codes, then deductive codes, then exploring how each research question was coded.

Ontological & Epistemological Stance

This thesis uses constructivist and theory-driven approaches to analyzing data. Constructivism in research focuses on meaning-making by investigating how people interpret and describe their experiences (Creswell & Poth, 2016). It is often used in qualitative research methods such as interviews and during thematic analysis. This approach acknowledges subjectivity as the researcher recognizes their own role in shaping the interpretations and findings (Creswell & Poth, 2016). Constructivism aligns with a relativist ontology, reasoning that reality is not fixed but is socially constructed and varies between individuals or in group experiences (Lincoln & Guba, 1985; Guba & Lincoln, 1994). Epistemology is related to how we know things and how we develop knowledge. The constructivist approach to data analysis aligns with the interpretivist epistemological stance, believing that knowledge is built through experiences, interactions, and interpretation (Schwandt, 1994). It is an appropriate lens through which to analyze a focus group interview because of the collective approach to making meaning (Creswell & Poth, 2016).

Saldaña (2021), author of *The Coding Manual for Qualitative Researchers* suggests that theory-driven data analysis primarily happens in second level coding. He explains that coding is not just about labelling data but about linking and aligning it not only with an ontological and epistemological stance, but also, grounding research in existing theoretical frameworks through what he calls theoretical coding. His emphasis on flexibility and adaptability throughout the coding process and the focus on introducing known theories and frameworks to investigate connections in the data (Saldaña, 2021) make this an appropriate method for this study.

Recruitment

Between March 2024 and October 2024, recruitment efforts included sending out two mass emails of over 200+ faculty members at a higher education institution in Canada, a recruitment message was posted on three different Facebook groups related to higher education in Canada, and two messages were posted on LinkedIn (Access the

recruitment messages in Appendix I). However, to avoid potential conflicts of interest, no faculty members were contacted that had directly worked with me.

Sampling

The sampling methods employed were three non-probability sampling types: convenience, purposive, and snowball. Non-probability methods can be biased and non-representative of the broader population sampled as the participants are selected by the researcher and often self-select for the study (Stratton, 2021). Convenience sampling is a method where participants are selected based on their accessibility and proximity to the researcher. This approach is often used due to its cost-effectiveness and simplicity, especially when time or resources are limited (Creswell & Plano Clark, 2010). According to Kriska et al. (2013), convenience samples are commonly used in graduate theses or dissertations due to constraints such as time and budget. This is relevant in this case, as my degree must be finished within a limited timeframe because my educational institution charges annual fees, and funding is partially provided by my employer. Purposeful sampling was used to ensure the participants' lived experiences would be relevant to the research questions, and that they would be familiar with the subject of the research study (Palinkas et al. 2015), in this case, teaching online in higher education. The target participants for this study were faculty members who developed online courses. It was essential that participants not only taught or delivered the courses but also developed the content themselves. This requirement ensured that participants had significant control over the course design, making their responses relevant to the interview questions. No prior knowledge or experience with UDL was required; in fact, a diverse range of experiences was preferred in order to compare and contrast different experience levels. Additionally, participants were encouraged to suggest other potential candidates for the study, employing the snowball sampling method (Creswell & Plano Clark, 2010). However, this strategy did not yield any additional participants. After these efforts, five participants were recruited. One participant was disqualified due to a potential conflict of interest since the faculty member in question has a personal friendship with my spouse. One participant failed to respond to the consent form and did not reply on time when a follow-up message was sent and was therefore also disqualified. This meant there were three valid participants remaining.

Sample Limitations

Due to the scope of this project, focus group interviews were not conducted with other stakeholder groups, such as students, instructional designers, or administrative staff in higher education. These groups could have provided valuable perspectives to create a more holistic understanding of the implementation of Universal Design for Learning (UDL) in online courses. Students, as the primary beneficiaries of course improvements (Burgstahler, 2020; Kozleski, 2020; Doll et al. 2021; Flanigan et al. 2023; Kirsch & Luo, 2023) could offer insights into their needs and preferences. Instructional designers (IDs), who often work with faculty members to design online courses (Chen & Carliner, 2021; Carliner & Chen, 2024) could contribute knowledge about pedagogy, accessibility, technological support and challenges. Administrators who help define policies (Sarghini et al., 2023) could provide perspectives on institutional policies, resource allocation, and their understanding of UDL practices. The exclusion of these groups is a limitation of this study, and their input presents a

compelling avenue for future research. Incorporating the perspectives of these additional stakeholders could deepen the understanding of how UDL principles are applied in higher education online courses (Mertens, 2020; Reeves & Lin, 2020).

Participants

A total of three participants were interviewed as a focus group. Table 3 presents the participant demographics.

Table 3

Participant Demographics

Descriptor	Participant 1	Participant 2	Participant 3
Fictitious Name	Bikram	Fahim	Claudia
Gender	Man	Man	Woman
Age Range	18-25	26-35	46-55
Self-identified level of UDL knowledge prior to interview	Beginner	Beginner	Intermediate
Field of teaching	Applied sciences, Fluid mechanics	Applied sciences, Natural sciences	Social sciences, interdisciplinary studies
Years experience teaching	1-4	1-4	10+
Number of courses taught online	1-4	1-4	10+

Participant Protection – Ethics & Consent

When qualitative and quantitative data is collected from human participants, it is part of the research protocol to gain ethics approval before starting the study and gain consent from the participants. Both of these require specific forms and protocols. The ethics certificate can be accessed in Appendix J.

Once ethics was obtained, recruitment began. When recruitment was finished, participants were sent a consent form to sign. The form explained how participants were in no way obliged to participate, were free to discontinue, would suffer no penalty for discontinuing, and would have no negative consequences should they participate or not, continue or discontinue the study at any point. They were also assured that their refusal to participate would remain confidential and known only to the researcher. The form also stated that their identities would be made anonymous to anyone except the researcher and other participants by removing names or any identifiable information. The raw data would be kept on a secure laptop for five years then destroyed. They were also briefed on the topic (UDL in higher education) and explained that their participation will help advance the student experience of higher education by furthering the research on UDL. The consent form can be accessed in Appendix K.

Method – Focus Group Interview

Due to the exploratory nature of this study, a qualitative approach was used because it is ideal for “exploring, describing, or understanding a central phenomenon” (Creswell & Plano Clark, 2010, p. 285). Johnson & Christensen (2020) stated that “qualitative methods are used to understand the objectives and outcomes in a deeper way and to explore for other unanticipated outcomes” (p. 133). Participants were invited to participate in a focus group interview on Universal Design for Learning (UDL) in online courses.

Focus-group interviews, a method where participants interact on a researcher-defined topic, usually have four to ten participants, meet for up to two hours, and are guided by a moderator using open-ended questions (Morgan, 1996). Four to ten participants is normally the ideal number to balance the perspectives for effective group dynamics and to engage in deep enquiry regarding specific behaviours and perceptions (Krueger, 1994). Smaller groups of four to six are easier to recruit, however, they may limit the range of experiences during the conversation. Larger groups are difficult to recruit and manage, and some participants may not get the opportunity to share as much insight as others, but they can also offer a large variety of perspectives. It is, therefore, important to select the appropriate number of participants to meet the research goals and ensure all voices are heard (Krueger & Casey, 2009). Basch (1987) explained that focus group interviews explore “conscious, semi-conscious and unconscious psychological and sociocultural characteristics and processes” (Basch, 1987, p. 411; Lee, 2023). Kitzinger (1995) highlighted how focus groups let people process and clarify their views in a way one-on-one interviews do not. Similarly, Thomas et al. (1995) noted the richness of data from the social interaction and dynamics unique to group discussions. Morgan (2001) even argued that focus groups’ greatest strength is their ability “to bridge social and cultural differences” (p. 142), making them especially valuable in diverse settings like higher education.

Despite their strengths, focus groups have challenges and limitations. For example, separating individual opinions from group perspectives because culture, personality, and comfort levels shape how much participants contribute (Gibbs, 1997). The group setting can also lead to spontaneous, unplanned discussions that are harder to steer than one-on-one interviews (Gibbs, 1997; Morgan, 1996). Researchers need to let the group guide the conversation while gently keeping it on track (Morgan, 1996). Some participants may feel uncomfortable speaking up, especially if there’s a dominant voice in the room. To avoid this, it is often better to create homogeneous groups so that one high-status participant doesn’t take over (Sim & Waterfield, 2019).

Data Collection – Interview Procedure

Table 4

Data Collection Procedure

Step	Procedure
Invitation	An invitation to participate will be sent out to potential candidates, asking them to participate or suggest other participants (Appendix I)
Identification	Appropriate participants will be identified and contacted from those who agreed to participate.
Contact & consent	Participants will be contacted and asked to sign a consent form (Appendix K), that informs them clearly of the scope of the research study and that they can withdraw at any time without negative consequences.
Schedule	When the consent forms are signed, a time and date will be scheduled for the interview.
Data Collection	The primary source of data will be semi-structured focus group interviews with open-ended questions (Appendix L). A secondary source of data will be obtained using a demographic survey (Appendix M). The focus group interview will be conducted online on Zoom for time and budgetary reasons and will last approximately one hour. The discussion will be recorded, and participants will be told in advance.
Aftermath	When the interview is over, the participants will be thanked for their time and contribution and told that they will be contacted soon to review the transcript of the interview and approve it or ask for changes.
Approval	The interview will be transcribed automatically using Zoom and then analyzed in Dedoose. Approval will be requested from each participant of the final transcript.

Data Analysis

This section is divided into the following parts. Introduction to Data Analysis, Six-Steps of Thematic Analysis which details Braun & Clark's framework for thematic analysis (Braun & Clark, 2012) and how it was used to analyze the interview data. Inductive Coding explains the first and select level coding process and Deductive Coding details the applied codes. The last sections explore the research questions.

Introduction to Data Analysis

Qualitative data usually is often a combination of both inductive and deductive coding, both of which can add different layers and dimensions to the analysis (Braun & Clark, 2012). Due to the exploratory nature of this research study, a primarily inductive approach was used to code the data, however, deductive coding also took place. This mixed approach was appropriate to answer the research questions because they sought to broaden knowledge on a specific populations' knowledge and experience with a topic

(Wasti et al., 2022). The inductive approach was used to code emerging information that felt informative, personal, anecdotal, and/or critical to the participants. This allowed for the data to speak for itself, letting the participants' answers to the interview questions guide the findings of the research, as opposed to searching for specific topics within the data (Wasti et al., 2022). The deductive approach, in contrast, was used to explore, quantitatively, the number of times participants consciously or unconsciously referenced Universal Design for Learning guidelines, Equity, Diversity, and Inclusion (EDI), principles of Self-Determination Theory, and Web Content Accessibility Guidelines. Lastly, the data analysis also considered how participants interacted and how meaning is negotiated collectively, which is unique to focus groups (Sim & Waterfield, 2019).

Six Steps of Thematic Analysis

To analyze the interview data collected, Thematic analysis was used in the six-step framework defined by Braun & Clark (2012). Thematic analysis is a reflection and search for subjects that happens through “careful reading and re-reading of the data” (Rice & Ezzy, 1999, p. 258). Recurrent themes emerge as being important to the phenomenon (Daly et al., 1997). Table 5 presents the six-steps with a description of the procedure used in this study.

Table 5

Braun & Clark's Six-Steps of Thematic Analysis

Step	Procedure
Familiarization	Become familiar with the data by reading it multiple times. The transcript for the interview was only 1 hour long, so I read through it multiple times.
Coding	A code is a short word or phrase that acts as a label, assigning meaning to an excerpt in a data set (Johnson & Christensen, 2020). The process began with inductive coding to allow the data to speak freely and let codes emerge without any external influence (Wasti et al., 2021). Then, deductive coding of UDL, EDI, WCAG, and SDT added the frameworks, guidelines, and psychological theories layer of the analysis. Dedoose Data Analysis software was used to add codes to segments of the interview transcript.
Generating Themes	The codes were categorized into themes and the themes were coded again into the data, in order to allow the later extraction of interesting visual graphs that compare and contrast codes and themes.
Reviewing Themes	Review, reorganization, and merging of themes were conducted to create a narrative that reflects the data. The themes were reflected upon to ensure they were distinct from each other and coherent.
Defining and Naming Themes Writing Up	I defined each theme in detail. The theory, literature, and important concepts in the study were returned to frequently to ensure alignment. The findings, including codes, themes, and reflection were written up into a paper that explains, contextualizes, and reports the details of the study.

In the findings, the quotes are mostly presented as-is, with only small removals of uhms or uhs, and inserts of [brackets] to keep the flow of the sentence. Some of the quotes are longer, but contain rich details that are important to the study and were therefore incorporated in full.

Inductive Coding

Inductive coding was performed first as a way to allow free coding, letting the data speak for itself with no pre-determined ideas or biases on what would come of it (Wasti et al., 2021). The inductive coding process involves recognizing and encoding significant moments in the data prior to deep interpretation (Boyatzis, 1998). “A “good code” is one that captures the qualitative richness of the phenomenon,” (Boyatzis, 1998, p. 1). When the first step of inductive coding was performed, many codes emerged that were then sorted into categories. This sorting process took place over many weeks and required multiple iterations of coding of the data.

Deductive Coding

Deductive coding requires researchers to interpret and code data based on existing theories or concepts (Johnson & Christensen, 2020). Coding the UDL framework deductively was already determined when the data was first collected, but EDI, WCAG and Self-Determination Theory emerged as deductive codes as the themes associated with those concepts kept recurring in the data. This research is fundamentally grounded in the Universal Design for Learning framework; therefore, it was only natural that any statement made by a participant that reflected one of the UDL principles be coded. The purpose was to collect data to discuss their current knowledge levels of UDL and to examine with quantitative data which UDL guidelines the participants implemented in their online courses. The UDL guidelines were coded using the three principles, the nine guidelines, and the 36 sub-guidelines. Each sub-guideline contains a definition and specific actions to satisfy the guideline. Each of these guidelines was added as a code in the Dedoose Data Analysis software and the interview transcripts coded with the guidelines. EDI, or Equity, Diversity, and Inclusion was applied as deductive code to any statement that related to the specific ideas of each word. Another deductive code applied was Self-Determination Theory (SDT), the three categories, autonomy, competency, relatedness. Lastly, the Web Content Accessibility Guidelines (WCAG) associated with online learning materials were coded to relate them directly to certain UDL guidelines. A list of the WCAG guidelines related to online learning can be accessed in Appendix N.

The overlap of the UDL guidelines, EDI, SDT, and WCAG creates a matrix of interconnected concepts that can be explored as an added layer to the research questions in this study to fill a gap in the literature.

Research Question 1 Coding

RQ1 focused on how faculty members describe different aspects of Universal Design for Learning (UDL) in their own personal perspective. The first interview question asked participants to describe what UDL means to them. Codes such as “awareness of UDL”, or “no knowledge of UDL” were generated each time a

participant made a statement that clearly indicated that they were describing UDL such as, “For me, UDL is...”, “UDL means...”.

Research Question 2 Coding

RQ2 focused on how faculty members describe adding Universal Design for Learning (UDL) in online courses they taught. The second interview question asked participants to describe if and how they added UDL to their courses online. Codes such as “added UDL” were added during first level coding each time a participant made a statement that clearly indicated that they were describing UDL implementation such as, “What I did to add UDL was...” or naming any specific implementations they made. These were then coded deductively using UDL, EDI, SDT, and WCAG to categorize the implementations.

Research Question 3 Coding

RQ3 centered on the challenges that faculty members in higher education encounter from gaining knowledge and/or adding UDL in their courses online. No direct question was asked of them because it may have generated vague answers or answers that were not directly related to their lived experiences. Instead, the interview was scanned for statements that made clear indications of challenges such as, “the challenge was...”, “what was difficult was...”, “it was hard because...”. This scan generated codes such as “technology/online”, “cultural background” “educational background”, “student communication”, and institutional failures such as “lack of institutional support” and/or “no clear guidelines from institution”.

Research Question 4 Coding

RQ4 sought to uncover what UDL-related resources faculty members in higher education know about and have used, and most importantly: what can be done further to assist them in gaining knowledge about UDL and adding it to their courses online? As the participants answered the interview questions that asked them directly about what they know and use and how they can be supported, codes emerged about the responsibility of the university, and the need for clear guidance.

Chapter 4: Findings

This chapter presents the study findings that resulted from the focus group interview. Section one covers sample demographics. Section two begins with first-level coding then moves on to second-level coding to introduce the emergence of three main themes of the research study, Descriptions, Challenges, Support, followed by the section on Participant Interactions. This leads to the following three sections which describe the four research questions in relation to each main theme. The next section covers research question one, Describing UDL - Awareness. Then research question two, Describing UDL – Implementation, research question three, Challenges with UDL, then research question 4, Support with UDL. Last, the application of deductive coding such as the UDL framework, EDI, Self-Determination Theory (SDT), and WCAG is described.

Positionality Statement

As an instructional designer with experience in online course development, I recognize that my professional background may influence how I interpret faculty responses related to Universal Design for Learning (UDL). My familiarity with instructional design practices could lead to assumptions about participants' intentions or strategies. To minimize bias, I used a semi-structured interview format to allow participants to define UDL in their own words, ensured open-ended questioning to avoid leading responses, and practiced reflexivity through journaling to remain aware of my assumptions. Also, I allowed participants to review summaries of their transcripts and used a coding process that included both inductive and deductive approaches to balance interpretation with evidence. These strategies aimed to ensure that participant voices remained central and that findings were grounded in their lived experiences rather than my professional lens.

Sample Demographics

The desired candidates for this study were faculty members in higher education institutions in Canada who had taught at least one course online and were the developer of the course material, meaning that they had at least some control over how the materials were created and disseminated. This was important to the study because the interview participants needed to have had agency and decision-making power in the course they taught for their answers to be related to personal experiences for their responses to properly answer the research questions, which seek to uncover information on individual knowledge and practices.

The participants were asked to fill out a survey that would record their demographics. Ideally, the survey would have been sent to them prior to the interview, however, due to researcher error, the survey was sent to them one week after the interview, when a new ethics approval certificate was requested and issued detailing the demographic survey. The final participants will now be referred to as “Bikram”, “Fahim”, and “Claudia”. The demographic survey details can be found in Appendix M.

Out of three participants, two were male, one was female, none identified as other. One participant was in the 18-25 age range, one was in the 26-35 age range, and one was in 46-55 range. Two out of three participants self-identified as beginners in

UDL knowledge, whereas one self-identified as intermediate. Two participants teach in the applied sciences, while one teaches social sciences. Two out of three participants have one to four years experience teaching in higher education, as well as one to four number of courses they have taught online. One participant has ten or more years experience teaching higher education and taught ten or more courses online. Table 3 in section 3.6 presents the participant demographics in detail.

“Claudia’s” transcript contained 24 excerpts (2330 words), “Bikram’s” contained 20 excerpts (2510 words), and “Fahim’s” contained eight excerpts (989 words). This reflects the number of excerpts extracted from the interview data and the amount the participants spoke. No sentences were omitted from the transcript, meaning that the number of excerpts accurately represents how much the participants spoke. Although three participants do not represent a population; it is still interesting to gain the insight of particular members of a population.

First & Second Level Coding

As first-level codes were applied to the focus group data, patterns emerged and codes formed on themes such as anecdotes, challenges, students, implementation, and support- whether needed or existing. Table 6 presents examples of first-level codes and their associated excerpts.

Table 6

First Level Coding with Participant Excerpt Examples

Code	Excerpt
Resources – low level knowledge	“So, frankly speaking, I don't really know any resources. However, I'm very willing to learn if there are any, if maybe Claudia knows any or Fahim knows any.”
Anecdote on UDL	“I try to really use my learning outcomes to drive assessment or graded activities all the time, and like, really, always going back to that.”
UDL implementation not by participant	I'll be graduating next term. They asked me if I would like to have my degree saying, "Master of Applied Science" or if I would like to have it as "Magistrate in Applied Science." Magistrate is the gender-neutral term for it. So, of course, that's what I went with, and that's really what Universal Design for Learning is—you try to accommodate everybody and try not to use language that discriminates or divides or creates classifications.
Adding multi-modes	"I'm just happy to share quickly. For me, it means that I don't use a video unless it's captioned. I try to only use videos with captions and audio descriptions.”

Mentioned other learning theory

"Fahim asks "Claudia, could you tell us if UDL is similar to inquiry-based learning or project-based learning? Are these kind of similar?"

Bikram says "I think those are practices that could be associated with the principles of UDL, for sure."

Claudia "I think when it comes to UDL, inquiry-based learning, and all those things, I'm sure there are overlaps. But at the same time, inquiry-based learning has more to do with how you are learning stuff, while UDL has more to do with how you are making it easier for everybody to learn. So, of course, there would be overlaps."

Faculty resistance

"I suspect like most instructors, they would say that, right? I mean, maybe people just want to do research and don't want to teach, right? But that's part of the culture of access kind of thing that I was talking about, right? This relational component of what we do."

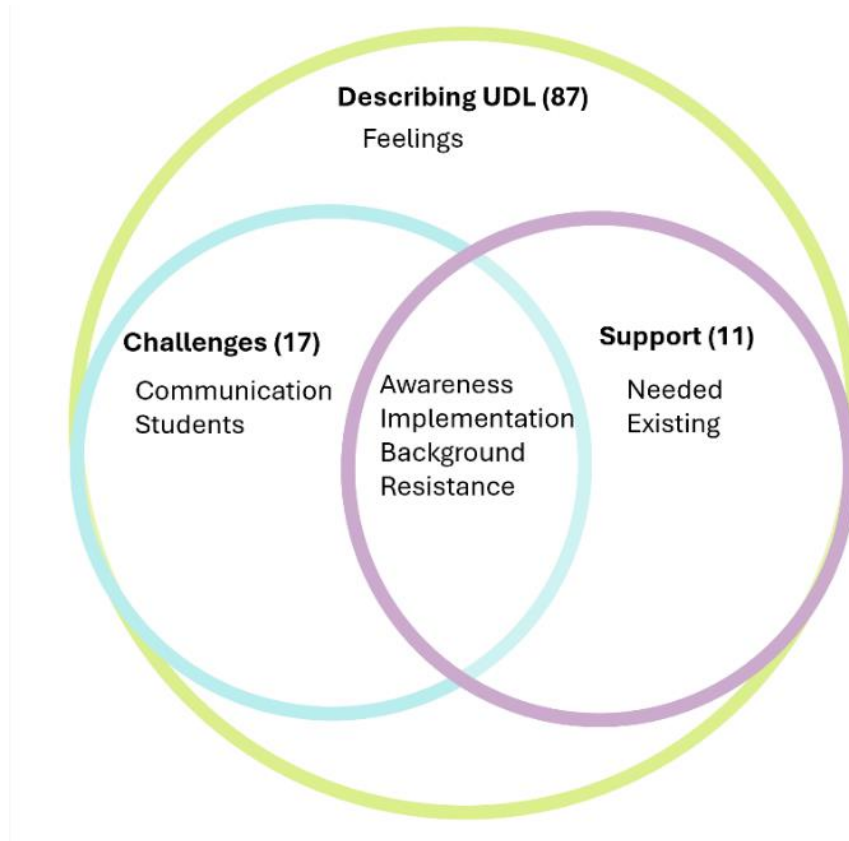
I went through multiple iterations of coding and reflection to achieve coherent codes with corresponding themes. During first level coding, codes such as, "awareness of UDL", "UDL implementation not by participant", "ideology behind UDL", "mentioned other learning theory", "cultural background", "educational background", "knowledge level" and "anecdote on UDL" emerged as the participants explained UDL from their point of view. Then they were asked to describe their experience adding UDL to their online courses. When a participant made a statement that described their direct implementation of UDL principles, whether consciously or not, a code was generated to indicate the type of implementation they made. Codes such as, "adjust accent to sound neutral", "culture of access", "adding multi-modes", describes visuals", "stops between problems to take questions", "student performance", "allow students to keep camera off", "faculty resistance", and "challenges with UDL" were generated. When asked about support methods, codes such as "resources – low level knowledge", "centers for teaching and learning", "CAST website", "institutional support needed", "clear guidance needed", "formal instructions" were generated.

During second-level coding, the codes were reflected upon as patterns emerged. The codes were then re-written and merged into themes to create distinctions between each of them. The three main themes that emerged were Describing UDL, Challenges, and Support. Within these themes, many sub-themes developed as well, with some of them overlapping. The themes were then coded into the data. Describing UDL was tagged 87 times, Challenges 17 times, and Support 11 times, showing that the interview method used generated many rich and detailed descriptions from the participants. All challenges and support excerpts were descriptions. Some descriptions were of feelings, but were not challenges or support related. Challenge-related themes were communication and students. Support-related themes were needed and existing support. Themes that were descriptions and related to both challenges and support were Awareness, Implementation, Background, and Resistance.

Figure 1 presents the overlap of sub-themes within themes.

Figure 1

Inductive Coding Themes and Overlapping Sub-Themes



The final codes and themes and sub-themes used to sort the data are presented in Table 7. The associated codes and the number of times they were tagged is in brackets. Table A8 in Appendix O presents the definitions of the themes and sub-themes.

Table 7*Themes, Sub-Themes, Codes, and Code Counts*

Theme	Sub-Theme	Codes and Code Count
RQ1 Describing UDL Awareness	Awareness(109)	Common UDL Jargon(53) Factual statement on UDL(18) Language impact on UDL(5) Participant low-level knowledge(11) Reference to another learning method(3) Ideology behind UDL(19)
	Feelings(25)	Positive Feeling(18) Negative feeling(6) Reason for learning about UDL(1)
RQ2 Describing UDL Implementation	Implementation(18)	N/A
RQ3 Challenges with UDL	Students(11)	N/A
	Challenge Awareness(9)	Cultural impact on awareness (5) No official guidelines (3) Need to do own research (1)
	Challenge Communication(22)	Busy schedule (2) Cultural impact on implementation (4) Lack of awareness (1) Needing accommodations (1) Online aspect/technology (6) Challenges with students (4) Challenges with the institution (4)
RQ4 Support for UDL	Support Existing(4)	N/A
	Support Needed(12)	N/A
Participant Interactions	Related to Participant(35)	Answered a question by other participant (8) Asked a question to other participant(s) (8) Felt the same as another participant (7) Learned something from other participant (5) Repeated UDL related word after someone else said it (2) Supported the implementation, example, or suggestion on UDL said by another participant. (5)
	Participant Excerpt (117)	Bikram (32) Fahim (21) Claudia (64)

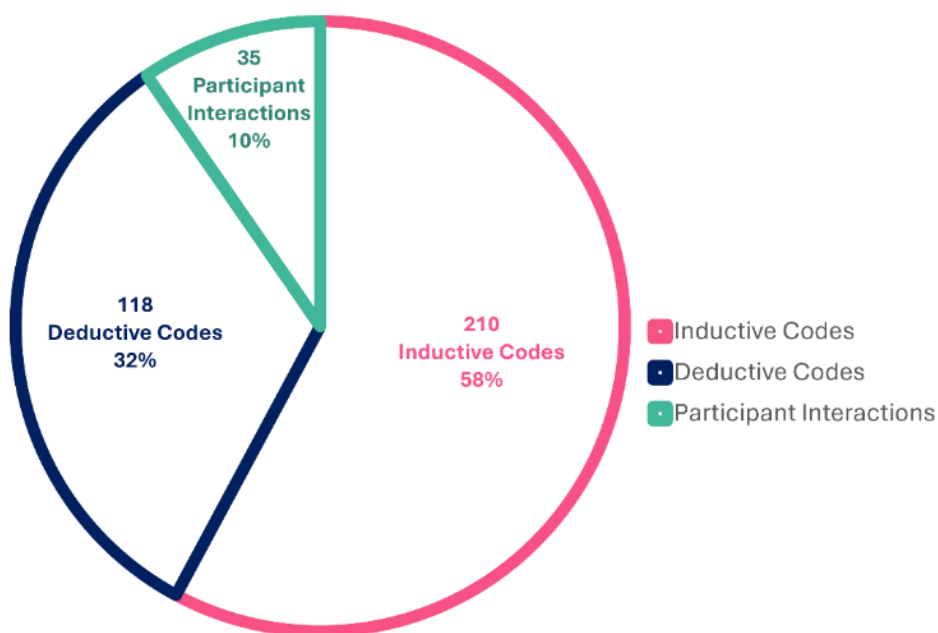
Note. RQ stands for Research Question.

Participant Interactions – Findings

Participant interactions can deepen the level of understanding and interest in focus group interviews, leading way to findings that may not have been discovered in one-on-one discussions (Thomas et al., 1995). Comparing the code count of “participant interaction” with all other types of codes, Figure 2 shows that inductive codes (minus participant interactions) were tagged 210 times (58%), deductive codes were tagged 118 times (32%), and participant interactions were tagged 35 times (10%). The specific participant interaction codes and their count are presented in Table 5. Table 6 shows examples of excerpts that were coded with participant interaction codes.

Figure 2

Distribution of All Codes – All participants included

**Table 5**

Participant Interaction Codes and Code Count

Code	Code Count
Answered a question by other participant	8
Asked a question to other participant(s)	8
Felt the same as another participant	7
Learned something from other participant	5
Repeated UDL related word after someone else said it	2
Supported the implementation, example, or suggestion on UDL said by another participant	5

Table 6

Participant Interaction Codes with Participant Excerpt Examples

Code	Participant	Excerpt
------	-------------	---------

Learned something from other participant	Claudia	“I really like that example that you gave about the inclusive terminology for your degree. I had never heard the gender-neutral terminology before, but I like that.”
Learned something from other participant + Asked a question to other participant(s)	Fahim	Fahim asked, “Claudia, could you tell us if UDL is similar to inquiry-based learning or project-based learning? Are these kind of similar?”
Answered a question by other participant	Claudia	Claudia responded: "I think those are practices that could be associated with the principles of UDL, for sure."
Felt the same as another participant	Fahim	“I think I have a similar situation with P1. I didn’t know about the framework or the processes in detail.
Repeated UDL related word after someone else said it	Bikram	“What I was saying was, there's also this fact that, a lot of times, the faculty members that are there may or may not be of the opinion that because there was no such culture of access or stuff like that 30 or 40 years ago, you really have to adapt yourself.”

Coding the participant interactions was essential for uncovering patterns associated to peer learning, common understanding, and the importance of mnemonics and language in learning. Coding is not a rigid process but instead is a creative, iterative, and reflective practice that emerges through cycles of thoughtful processing (Saldaña, 2021). Coding the interactions allowed for a systematic examination of how the participants collectively constructed meaning around the theme of UDL, and emphasized the importance of common understanding, collaborative strategy-building, and knowledge diffusion. Faculty peer learning is shown to enhance the sustainability of inclusive teaching practices (Ward & Selvester, 2012) making it crucial to analyze the interactional dynamics between participants. The findings in this study showed that the participants built on each other’s insights, asked each other questions, clarified meaning for each other, and echoed each other’s phrases and sentiments. These interactions add depth and perspective to the findings (Saldaña, 2021).

Research Question 1 Describing UDL Awareness – Findings

The findings in this section answer RQ1: How do faculty members in higher education describe Universal Design for Learning (UDL) in courses online?

The first question during the interview process *What does Universal Design for Learning (UDL) mean for you when it comes to creating online courses?* was designed to answer the first research question. This question attempted to get the participants to describe UDL in their own perspective and give general statements and thoughts on

UDL, without guiding them to think or feel about it in any particular way. It also remained neutral enough in knowledge-level because the participants were not required to have any prior knowledge of UDL to participate, and because this opened the door for them to communicate their lack of knowledge in full sentences, as opposed to asking whether they know about UDL (yes/no closed question), or what they know (and risk getting nothing). The open nature of this question got the participants discussing their understanding and knowledge levels in broad ways. They shared anecdotes about their own knowledge, their own implementation, implementation by the institution, how it made them feel, and how it was received by students. Codes were identified during inductive coding related to describing UDL and awareness. These codes were generated from statements that the participants made when answering the interview questions.

Table 9 labels the codes tagged related to describing UDL, and their amounts. Some codes were tagged often (18 times) such as “factual statements”, some were only tagged once, such as “reason for learning UDL,” but judged important during first level coding.

Table 9

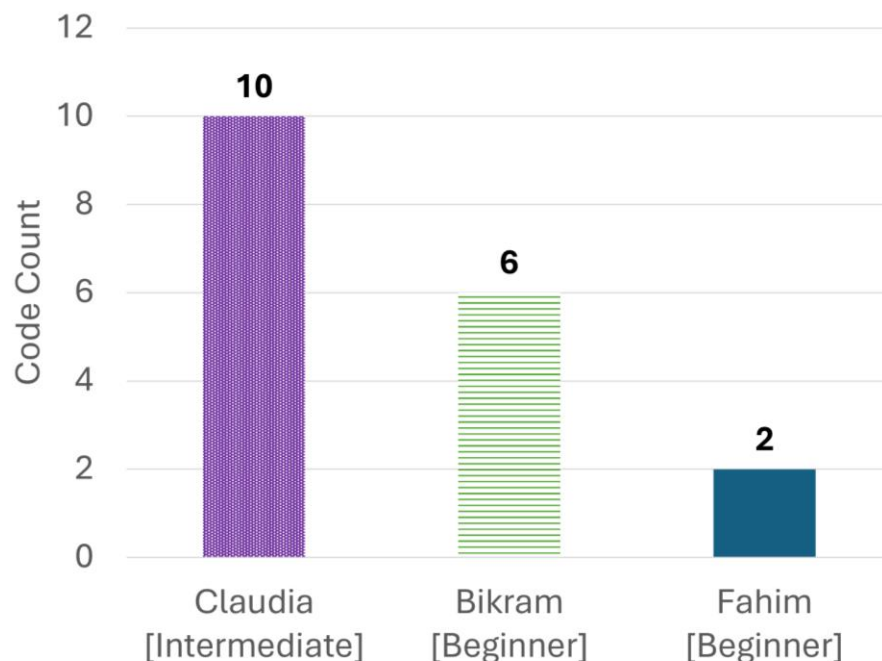
Codes Describing UDL

Describing UDL (110)	
Awareness (90)	Ideology Behind UDL (20)
Common UDL jargon (53)	Describing ideology (19)
Factual statement on UDL (18)	Reason for learning about UDL (1)
Language impact on UDL (5)	
Participant low-level knowledge (11)	
Reference to another learning method (3)	

“Common UDL jargon” is particularly interesting because it shows how ordinary UDL-related language is, and how it can propagate and echo just in a 1-hour discussion amongst peers. “Factual statement on UDL” is interesting because it was tagged often for all participants. What makes it interesting is the ratio it was tagged by participant versus their self-identified level of UDL knowledge. Figure 3 presents the findings of this analysis.

Figure 3

“Factual Statement on UDL” Code Distribution by Participant



Participants and Self-Reported Level of UDL Knowledge

UDL Awareness

When the participants described UDL as a general concept, these statements were coded as “describing UDL” along with “awareness Level”, or “ideology behind UDL.” One particular term mentioned by “Claudia” is identified, namely the phrase, *“culture of access”*.

Awareness, or knowledge of Universal Design for Learning (UDL) was a recurring topic that was addressed both consciously and unconsciously by the participants. What is meant by that is that sometimes consciously, or purposefully, participants explained their own levels of knowledge and said what they knew or thought about UDL. For example, “Fahim” said, “I didn’t know about the framework in detail, but yeah, I remember I heard of this term UDL quite a few times, but I’m not very familiar with the steps.” In contrast, sometimes they unconsciously, or accidentally, were showing their knowledge or lack of knowledge of UDL, for example, “Claudia” naturally asked “Bikram” if their name was being pronounced correctly, ensured multiple times that she wasn’t interrupting anyone or dominating the conversation, and also invited the others to participate in building a community of practice. “Claudia” said:

I'm sorry if I cut anybody off, the first step would be what was said about the practices in mechanical engineering, right? And so it would be, how could you generate disciplinary conversations around how to apply the UDL framework in specific, discipline-specific kinds of courses?

This is an example of "Claudia" unconsciously applying UDL in her interactions with "Bikram" and "Fahim". In contrast, another example of unconscious UDL application that is different, is when "Fahim" explained that he thinks he unconsciously applied UDL principles in his own course. He explains that he learned about UDL after giving that course. During Interview question 2, when asked about their experiences adding UDL to their courses, "Fahim" and "Bikram" had the following interaction:

"Fahim" said:

I'm not very sure if it's very relevant to this question. During my master's, I was involved in a research group, and I was one of the mentors [...] on how to write research papers and how to formulate problems. As I remember, I usually just searched some of the easiest examples. So, for example, how to make a dataset for any machine learning models. I used very simple examples and scenarios so that they could understand the process. Because writing a research paper or formulating a research problem is not an easy task. So, in that way, I wanted to make it inclusive. I wasn't sure if I was applying the UDL principles or not, but by breaking down the tasks into very simple examples, I implemented the process in that way. That was all online. I used the Zoom platform for that sort of teaching. That was my experience in that regard.

"Bikram" asked:

What do you think? Do you think when you were teaching, when you were mentoring the students, *were you aware of UDL at that point?*

"Fahim" responded:

Oh, my God! Uh, exactly. Yeah. *I don't think I was very much aware of this term UDL and its principles.* But later, what I understand is that UDL is about making the learning process more engaging and accessible to everyone. So, in that way, as I said, *maybe I was applying the principles of UDL unconsciously.*

When answering the first interview question, "Bikram" said first, "Universal design for learning is a design for learning which is universal in the sense that it is the most inclusive that it could be." He then immediately counted an anecdote about how the university he attends offered him the chance to choose between a gendered or gender-neutral title on his diploma. "Fahim" similarly expressed, that UDL "considers all the stakeholders of the education course. For example, the teachers and also the students. This design method includes all the characteristics that are needed to create a more inclusive and engaging learning experience."

"Claudia" echoed the other participants and related directly to "Bikram" by adding, "I really like that example that you gave about the inclusive terminology for your degree. I had never heard the gender-neutral terminology before, but I like that."

"Claudia" asked "Is it "Bikram"? Is that the correct pronunciation of your name?"

["Bikram" nodded with approval]

"Claudia" continued:

I think of UDL, online learning, and all kinds of learning. Yeah, as folks have said, using the words inclusive of all learners and, you know, trying to think of broad accessibility from the outset. For me, it's also a really big part of what I do in my classroom spaces, including my online classroom spaces, about trying to create what I call a 'culture of access.' UDL is a big component of that, as it relates to my materials, my content, and how I teach, and all of that.

When "Claudia" mentioned the term "*culture of access*", one that was unfamiliar and seemed to be a creation of the participant, "Claudia" was asked if she could elaborate on the term. "Claudia" said:

Yeah, that's really important to me, that students understand me from the outset as someone wanting them to be successful learners. And like, that's my job. Students are always so focused on the grade, like, "what grade am I gonna get", and it's a way for me to try to diffuse that. Instead, I really promote and support engagement and learning. I'm sure some of that might be tied to what I teach, right, like I don't teach a hard science or anything like that. That I want students to see me that way. And also, you know, thinking of a *culture of access*, it's about my relationship with students and their relationships with one another, right? And so, UDL is like a piece of it that I take responsibility for. I teach interdisciplinary disability studies classes. We spend time, especially in the first few sessions, and return to it over and over throughout the semester, developing accessibility practices that everybody is a part of and establishing norms for that.

I thanked "Claudia" for elaborating on the description.

Table 10 presents an extracted list of strategies that “Claudia” includes in her “*culture of access*” and which UDL guidelines they relate to.

Table 10

“Culture of Access” Compared to the Related UDL Guidelines

Accommodation	Related UDL Guidelines
Ensure students understand she wants them to succeed	8.1 Clarify the meaning and purpose of goals
Support engagement and learning above grades	7.2 Optimize relevance, value, and authenticity 7.3 Nurture joy and play
Create a strong relationship with students	8.4 Foster belonging and community
Establish norms promoting student involvement in developing accessibility practices together	8.3 Foster collaboration, interdependence, and collective learning

When the participants were asked if anyone had something to add before the second interview question was asked, “Bikram” said UDL does not mean much to him because he was trained in an academic system that does not focus on that. He then explained that he is an international student who only found out about UDL when he came to Canada and has only been aware of it for two years. When asked what academic system he was trained in, “Bikram” responded:

The Indian education system, where it's very exam focused. It's very focused on your grades and on your marks, or your lab performance and stuff like that. So, we are not really, because it's a hard science, because I study mechanical engineering, because also we are studying machines and stuff like that. We don't really sit down to talk about design for learning which could be universal. We majorly talk about engineering.

The last intervention by “Bikram” was important to the understanding of awareness in general because it brings into question cultural background in relation to access to UDL knowledge, demonstrating how UDL knowledge is not equally distributed amongst different cultural or educational backgrounds as he states his Indian and Engineering backgrounds impacted his knowledge of UDL. Contrarily, “Claudia” claims that even within the social sciences departments where she has taught, UDL is not at the focus of many institutions or faculty, even in teaching-focused institutions and liberal arts colleges. It is interesting, however, that “Claudia’s” background is North American, and her educational focus is Social Sciences, and she identified as intermediate knowledge in the demographic survey, whereas “Bikram” is of Indian background and Applied Sciences, “Fahim” is also in Applied Sciences, and they both identified as beginner. This could be a coincidence or could be an avenue for interesting future research.

Common UDL Jargon

Another interesting finding in terms of participant awareness is the use of common UDL jargon. This can be defined as words or phrases that are found commonly on the CAST website about UDL, in the literature on UDL, and identified by me (a UDL expert) as words commonly associated with UDL. Whenever one of these words was said by a participant during the interview, it was tagged with the code “Common UDL jargon”, along with either “Bikram”, “Fahim”, or “Claudia”, “Describing UDL” and “Awareness”. This was done to evaluate how often common UDL jargon was used during a 1-hour period in a discussion on UDL. It creates interesting future research ideas on the propagation of awareness, vocabulary, language, and peer-to-peer learning. Table 11 shows the common UDL jargon used, divided by participant, demonstrating that “Claudia” who identifies as intermediate in UDL knowledge, and “Bikram” and “Fahim” who identify as beginners, have a vast difference in the amount of UDL jargon they used. This finding is also reflected in the previous section, where “Claudia” used more factual statements about UDL than “Bikram” and “Fahim”.

Table 11

Common UDL Jargon Distributed by Participant

Bikram	Fahim	Claudia	
accessible	accessible	accessibility	engagement
accessible	communication	accessibility	engagement
accommodate	communication	accessibility	equitable
allotted timeframe	engaging	accessibility	executive functioning
communicate	engaging	accessible	feedback
discriminates	engaging	accessible	feedback
guidelines	inclusive	accessible	feedback
inclusive	more than one mode	accessibly	inclusive
		accommodation	inclusive
		accommodation	marginalized people
		accommodations	neurodivergent
		captioned	screen reader
		captions	screen readers
		communicating	support needs
		demonstrate	visual descriptions.
		knowledge	

If we examine the UDL jargon used divided by participant, it is interesting to note that “Bikram” and “Fahim” have similar demographic information and used UDL jargon the same number of times, while “Claudia” has a different demographic which involves a higher level of UDL knowledge, more teaching experience, and more online teaching experience, and she used UDL jargon almost five times more. Her UDL experience could be one of the factors influencing the vast difference in the amount of UDL-related jargon the participants used, which would align with the research mentioned earlier where faculty members with more knowledge and exposure to UDL

are more likely to implement it (Evmenova, 2018). The amount they spoke may be a factor but is inconclusive as “Claudia” spoke almost twice as much as “Fahim”, but about the same amount as “Bikram”. In Table 12, all overlapping words (i.e. communication and communicate, inclusion and inclusive) were united and the common UDL jargon words were combined on a matrix presenting the common UDL jargon used by all participants. Inclusive (or derivatives such as inclusion or inclusivity) was the most used UDL-related word, with every participant using it more than once.

Table 12

Common UDL Jargon Used by All Participants

Bikram	Fahim	Claudia	
allotted timeframe discriminates guidelines	more than one mode	accessibility captions demonstrate knowledge disability services equitable executive functioning	feedback marginalized people neurodivergent screen reader support needs timely feedback visual descriptions
<u>Everyone</u>			
accessible communicate engagement inclusive			

The word “inclusive” is crucial in the understanding of the fundamentals of learning as the sense of belonging is crucial to intrinsic motivation (Deci & Ryan, 1981).

Figure 3 is a word cloud showing the terms, with their size representing how often they were used (Mathews et al., 2015). To access the full data on the words and how they were compiled, access Appendix P. Word clouds are visual ways to get a big picture on an idea or concept (Mathews et al., 2015). Quickly in this word cloud we notice inclusive, communicate, accessible, and engagement. These terms are key to the concepts surrounding UDL, and show, once more, that the participants, regardless of their self-reported knowledge of UDL, understand some of the main ideology behind UDL.

Figure 3

Word Cloud of Common UDL Jargon



Lack of or Little Knowledge of UDL

Two out of three participants expressed their own lack of knowledge of UDL. “Bikram” said:

When it comes to what UDL is or what we could do and stuff like that, even today, even right now, I don’t know a lot of things that can be done in regard to UDL. I know UDL by what it means, but then, when it comes to specific things that can be done, I’m not there yet. There is still some lack of awareness in that. Of course, it’s my homework to do, but I guess awareness is another thing that we could really discuss when it comes to UDL.

Similarly, “Fahim” confirmed with “Bikram” by saying:

I think I have a similar situation with ‘Bikram’. I didn’t know about the framework in detail, but yeah, I remember I heard of this term UDL quite a few times, but I’m not very familiar with the steps or procedures of it. But yeah, as I am now also doing research in the curriculum design domain, so I’m very interested to know it.

Or when referring to UDL resources, “Bikram” said: “So, frankly speaking, I don’t really know any resources. However, I’m very willing to learn if there are any, if maybe ‘Claudia’ knows any or ‘Fahim’ knows any.”

Research Question 2 Describing UDL Implementation – Findings

The findings in this section answer RQ2: How do faculty members in higher education describe adding Universal Design for Learning (UDL) to their courses online?

The second question during the interview process *What is your experience with adding UDL in your online courses? If any.* was designed to answer the second research question.

Implementation, or to simplify the term for participants, adding UDL in an online course, can mean many things. The question was left open to allow participants to elaborate on their experiences, even if they had very little to say. “Claudia’s” answer was dense with information therefore each accommodation is enumerated for reference. “Claudia” said:

For me, it means that I don't use a video unless it's captioned¹. I try to only use videos with captions and audio descriptions². Say, PowerPoints, making sure that they're developed accessibly to a screen reader⁶. I use image description when I include images on slides³. I try, and I'm not 100% perfect at it, but I make sure my PDFs are accessible by screen readers⁷. I use a lot of those kinds of accessibility practices. I try to really use my learning outcomes to drive assessment or graded activities all the time⁸, and like, really, always going back to that. And so, for me, if I don't have learning outcomes associated with academic writing, I don't require writing. Like formal standard university papers. I open it up to having students demonstrate knowledge and meaning making in all kinds of way⁹. So, those are kind of some foundational practices. And I mean, there's other stuff pedagogically that I try in terms of establishing norms, like visual description⁴. When a person is talking, a student's sharing for the first time. I don't mandate cameras being turned on¹⁰. I think that I encourage it and encourage it when students are sharing, but I try to understand the broad range of living experiences that students have¹¹. And I also always have the chat, encourage use of the chat¹². I try to remember to do this, though I forget sometimes, but they're pretty good at taking charge, someone in the class is always responsible for reading out what gets put in the chat. I also never give a timed exam¹³.

Furthermore, later in the interview she added:

The thing I see students respond to the most is not requiring the standard, end-of-semester big paper¹⁴. I assess student engagement and learning often throughout a class¹⁵, and I try not to weight anything much more than anything else. So graded activities are fairly equally weighted¹⁶. The fact that they can do anything sometimes makes students freeze. But, you know, I show them examples of work from previous students. I get a ton of really beautiful, creative work that students submit, and they talk about the liberation in being creative or thinking and communicating with me in forms other than writing. They also like that I give content in a range of ways. So, you know, we might have a foundational book that we're reading across a semester or part of a semester. Of course, I use journal articles, but I also believe—especially if we look at knowledge production from multiply marginalized people who haven't had access to the academy—I like to center their work.¹⁷ We use a lot of blogs and podcasts and first-person writing and that kind of thing.⁵ And again, because of what I teach, I'm able to do that. But I think students also like having all of these different kinds of content to draw from.

Table 13 presents an extracted list of accommodations provided by “Claudia” in her online courses.

Table 13

List of Accommodations Provided by “Claudia” in Online Courses

Accommodations
1. Videos with captions
2. Audio descriptions
3. Image descriptions
4. Use journal articles, blogs, podcasts, first-person writing
5. PowerPoints accessible to screen reader
6. PDFs accessible by screen reader
7. Learning outcomes drive assessments
8. Learning outcomes that allow multiple demonstrations of knowledge
9. Don’t mandate cameras being turned on
10. Understanding a broad range of student experiences
11. Encourage students to use the chat
12. Never give a timed exam
13. Not requiring big written paper
14. Assess student engagement and learning often
15. Attribute equal weights to assessments
16. Center the work of marginalized people

“Fahim” also used UDL principles in a research group he taught online. He “used very simple examples and scenarios so that [students] could understand the process,” and because he “wanted to make it inclusive” was “breaking down the tasks into very simple examples.” Another strategy “Fahim” used to make his courses more accessible was using:

Clear modes of communication. For example, giving them the opportunities to ask questions. Another aspect was sharing additional resources for their smooth learning. So, for example, I shared my notes and several other resources so they could learn the learning outcomes more accurately. If I sum it up, communication played a big role in the past for me in the online classes.

Similarly, “Bikram” said that he would pause while teaching to “ask people if there were any doubts” and that he would “resolve them before moving on to the next question”. He said he would “make it a point to give this opportunity to let students tell [him] or communicate that they had doubts”. He explained that this was done because in the process he was teaching, if you “don’t really understand something at one point, it’s very important that the [question] gets asked and resolved”. Furthermore, “Bikram” said he used “whiteboards [that he would] write on,” and he “would talk in a neutral way” at the same time to ensure students understood him. He said, mentioning his accent:

One of the things that I tried to do to make it accessible to everyone was that I tried to speak in a neutral accent because English is not my first language.

Hence, I speak English in a certain way, in the way my teachers taught me, and of course, they were not always the best English speakers around. So, I really tried consciously to have a very neutral accent when I talked to students so that they could understand what I was talking about.

Table 14 shows a combined list of strategies used to add UDL to online courses by all the participants.

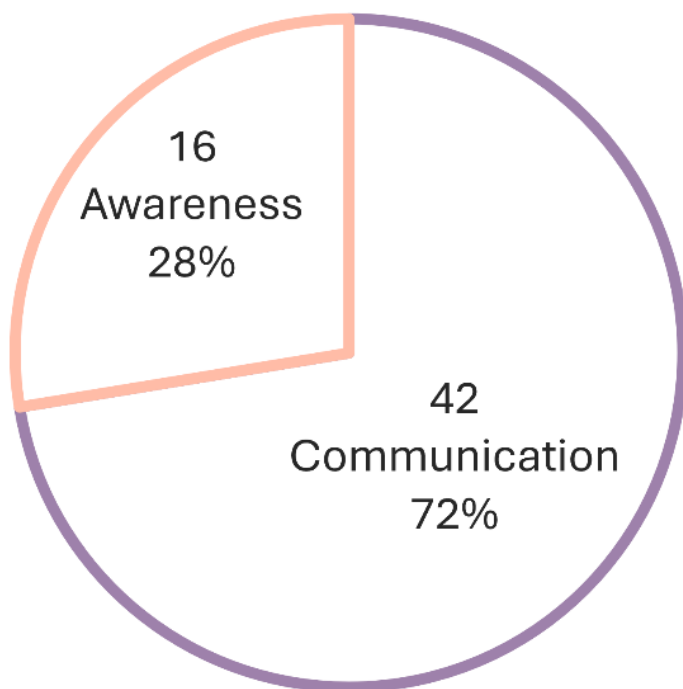
Table 14*Strategies used to Add UDL to Online Courses by All Participants Combined*

Strategies	
1. Adapt accent to be more neutral, to ensure students understand	13. Never give timed exams
2. Assess student engagement and learning often	14. Not requiring big written paper
3. Attribute equal weights to assessments	15. PDFs accessible by screen reader
4. Audio descriptions	16. PowerPoints accessible to screen reader
5. Break down longer tasks into shorter, easier tasks	17. Resolve any doubts before moving on to the next question
6. Center the work of marginalized people	18. Share resources and notes
7. Don't mandate cameras being turned on	19. Understanding a broad range of student experiences
8. Encourage students to use the chat	20. Use journal articles, blogs, podcasts, first-person writing
9. Give time for questions between each example	21. Use simple examples and scenarios to ensure students understand the process
10. Image descriptions	22. Use whiteboards to write main points and equations while speaking
11. Learning outcomes drive assessments	23. Videos with captions
12. Learning outcomes that allow multiple demonstrations of knowledge	

Research Question 3 Challenges with UDL – Findings

The findings in this section answer RQ3: What challenges do faculty members in higher education encounter when it comes to UDL?

No specific interview question was asked to answer this research question because self-reported data in research is notoriously biased (Stephens-Davidowitz, 2017; Yu, 2023). Instead, participants were asked to describe UDL implementation, and what worked or didn't work for them, as well as support methods they knew about or needed, and challenges emerged through their answers. Codes such as “lack of awareness”, “student understanding”, “institutional resistance”, “technology/online”, and “educational background” emerged naturally during first-level coding and after a lot of reshuffling ended together within the category of challenges. Communication was originally divided into implementation, students, and institution but was merged together under one topic code. Figure 4 shows 58 times an excerpt was tagged with “Challenges”. 16 (28%) times for “Awareness” and 42 (72%) times for “Communication”.

Figure 4*Challenges with UDL Identified During Coding****Challenges with Awareness – Findings***

The challenges about awareness that arose from the interview were related to cultural and educational background and lack of clear institutional direction.

“Bikram” said that he was “was trained in an academic system where [they] don’t talk about [Universal Design for Learning].” He was trained in the Indian Education System where, he says, it is, “very exam focused. It’s very focused on your grades and on your marks, on your lab performance,” because he studies mechanical engineering and machines, he says that they “don’t really sit down to talk about design for learning which could be universal. [They] mainly talk about engineering.” In contrast, “Claudia” was surprised that not more was being done in the North American institutions she taught at concerning UDL, especially in the social sciences department. Referring to the higher institutions where she taught other teachers how to teach, she said, “it’s always astounded me that it’s not more—that there hasn’t been more teeth to it, to be honest.” “Bikram” also mentioned that “in engineering, [they] have standards. [They] have one document that everybody refers to.” He says that he doesn’t “have such a standard when it comes to resources in UDL” that there is no “statutory body, or golden council on it” he says that UDL is “still very vague in the sense that there is no wider consensus.” “Claudia” asked “Bikram” to clarify what he meant by asking if he was relating to what she said earlier about “how little teeth” UDL has, how few “official bodies”. “Bikram” agreed by responding “yes, absolutely, yes” emphasizing that a challenge for him came from lack of institutional clarity and official standards.

Challenges with Communication – Findings

The biggest challenges that arose in the communication of UDL by the participants were the online aspect and accessibility technology, faculty resistance, and needing personal accommodations to provide timely feedback to students.

Both “Bikram” and “Fahim” stated that the fact that the course was online added challenges for them. “Bikram” said, “the fact that it was online in itself was a challenge that I tried to overcome because I am really used to solving problems on the board” he said that solving problems on Zoom was “a little difficult” because he “didn’t have a screen” to scribble with. Similarly, “Fahim” mentioned having difficulties with online communication. He said, “since the mode is online, it’s really hard to communicate well, no matter how much effort you put in. For example, you want to convey a message or some understanding, but the other person isn’t getting the correct message.” He explained that for him, in-person settings make it easier to engage with learners. Where “Bikram” mentioned Zoom issues, and “Fahim” mentioned communication with students as being a challenge, “Claudia” mentioned that the “hardest thing is making sure that [her] PDFs are accessible” and that it’s “kind of a bummer”. She explains that in her current teaching position in higher education, she can only receive help from the access center for students with disabilities in making her PDFs accessible if a student who is registered makes an official accommodation request. She expressed being frustrated that when she asked if she can “just send [them] the PDFs” and have them make them “screen reader effective” they “said no, the only way that can happen is if a student complains.” She said that she made announcements to her students asking them to make the requests because it is something that she says is hard for her to get done as a task.

When “Claudia” expressed this frustration, I asked an impromptu question to “Bikram” and “Fahim” to find out if they had experienced similar issues. If accommodations were only afforded if students specifically asked. Both of them responded that they had not lived similar experiences, however, “Bikram” also added that he thinks, on the part of the access center for students with disabilities that “it’s more of an excuse to not to something” and “that we would only do something when we are supposed to do it”. Another challenge mentioned by “Claudia” is resistance from faculty. She worked with faculty members to incorporate UDL in their courses and said she was happy to hear what “Bikram” and “Fahim” had done to make their courses more accessible, however, she mentioned that “when [she’s] done work on campuses, doing trainings for faculty on UDL and how to incorporate it, there’s so much resistance from certain folks.” Lastly, “Claudia” also mentioned the challenge of being neurodivergent herself and needing accommodations relating to giving timely feedback to students and communicating with them on their grades. She said:

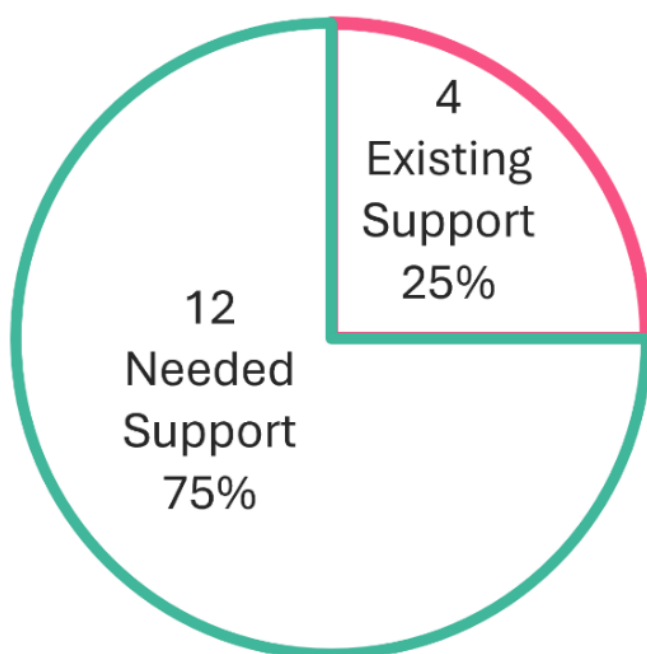
I identify as being neurodivergent and have certain executive functioning support needs myself. And getting feedback to students, and the kind of feedback I like in a timely manner, has always been difficult for me. I have a grad reader, which I’m grateful for, here for the first time—I didn’t have one at a previous institution. They help me with student grading and feedback, but I feel like that’s something that’s always been a challenge. I know with UDL, timely feedback and that kind of thing are super important.

Research Question 4 Support for UDL – Findings

The findings in this study report that support related to UDL is divided into two categories. Existing support and needed support. Codes such as “need for clear guidance” and “institutional responsibility” were generated in the first level coding and later categorized as support needs. Figure 5 shows that 12 times during the interview, the code “support needed” was tagged, and 4 times “support existing” was tagged.

Figure 5

Support for UDL Identified During Coding



Existing Support – Findings

The fifth question during the interview process What resources relating to UDL do you know about? Can you name them? Do you have examples? How did you hear about them? was designed to answer the fourth research question How do faculty members in higher education describe UDL-related resources? What UDL-related resources do faculty members in higher education describe using? During the interview, codes were generated such as “UDL resources” and “center for teaching and learning” within the larger theme of “Support for UDL”. “Existing support” emerged as a code that encapsulated all these codes.

When asked about existing support, “Bikram” spoke first to say, “So, frankly speaking, I don't really know any resources. However, I'm very willing to learn if there are any, if maybe “Claudia” knows any or “Fahim” knows any.” In saying this, he contradicted himself somewhat as later on he mentioned there are “eBooks you can

find. There are many PDFs you can find. There would be many fancy pamphlets you can find” he said that the university where he works has the “Center for Teaching and Learning, and there are other centers like that. So, of course, the library also has a lot of resources” demonstrating that he does have some knowledge of UDL resources. He does however explain that he meant “those resources are not something like an ISO. Right? And ISO is the International Standard Organization” implying that what he regards as support is official documentation. This sentiment is reinforced by his earlier quote stating that he feels like he is unaware of UDL as a result of there being no “statutory body or golden council”. While “Fahim” did not add anything about existing resources, “Claudia”, once again, gave an information-dense answer. “Claudia” mentioned the center for teaching and learning as a faculty resource and then said:

I always draw from the resources available from CAST, the Center for Applied and Special Technologies. A lot of their resources are often geared towards K-12 educators, but they do have some stuff for post-secondary. It’s like good books that are resources I found through CAST and AHEAD, I don’t know what the acronym stands for. It’s in the US, and it’s really focused on post-secondary access and students with disabilities. They have some good resources.

Her answer demonstrates a solid understanding of where to find a variety of UDL resources. This is consistent with her previous behaviour that demonstrates her level of self-reported UDL knowledge as intermediate, where the other two participants rated themselves as beginners.

Needed Support – Findings

The sixth question during the interview process What can be done to further support you as a faculty member to add UDL to your online courses? was designed to answer the sub-questions of fourth research question What additional measures can be introduced to support faculty members in higher education to gain knowledge about UDL? What additional measures can be introduced to support faculty members in higher education to add UDL in their courses online effectively? During the interview, the participants made statements that were clear indications of support needs. These statements were coded as “needed support”, “need clear guidelines,” “needs more research”.

Once again, “Bikram” spoke first and said “something that could be done to further support me in adding UDL to my online courses would be framing a set of guidelines” he specified that “how many guidelines” is up to the people who create the official rules, but that it “shouldn’t be vague, it should be clear-cut. For example, there could be 10 points that you have to follow. Among them, maybe one could be ‘turning on video shall not be mandatory,’ something like that. It should be specific.” He mentioned that it would help faculty members have a “starting point” for beginners like himself and “Fahim” to “learn more about UDL at [their] own pace”. He insisted that the UDL efforts coming from the institution should “have a direction” and that the direction should be anchored in the guidelines themselves. “Fahim” agreed, saying:

I think I’ll just align with “Bikram”, like he mentioned the guideline. I think we need some training and institutional support so that we can get familiar with the principles of UDL, so we can implement and apply them with our courses. That,

I think, will help build our professional competency and also make education more engaging.

“Bikram” also felt that more research was necessary for UDL to gain popularity. He said that “for UDL to pick up” there is “not enough research” and that the UDL domain has a gap to fill in applicable field research. He suggested that “there needs to be research with real interaction between researchers and educators, maybe setting up simulation” and that there needs to be “interdisciplinary research” with psychology students. “Claudia” related to “Bikram” and “Fahim” by asking to confirm what they feel is needed to learn more about UDL principles. She asked them if they feel that training is important, but what is truly important is “a desire to make learning accessible to the students”. “Bikram” responded “exactly, yeah”. “Claudia” was concerned that many faculty members just “want to do research and don’t want to teach” but that part of her *“culture of access”* is about talking, communicating, and having a relational component with students. “Claudia” added information about the need for disability services on campus for faculty as well as students. She said that “there could be potentially more leverage in having [faculty support spaces] be disciplinary-specific”. She also related to “Bikam” and “Fahim’s” adaptations they used in their online courses to show equations and special characters. She said:

When you were sharing strategies that you use to make an engineering course more accessible in the Zoom space. I also think I wish sometimes that disability services spaces on campus functioned as much for faculty support as they do for student support. [...] There’s a lot that could be done with resources geared toward faculty, all in the name of broader accessibility for all students.

Table 15 presents a summary of the support methods that participants expressed needing.

Table 15

Support Methods Needed by Participants

Bikram	Fahim	Claudia
Framing a set of clear guidelines (i.e. 10 simple mandatory points to apply)	Clear guidelines	Disability spaces on campus for faculty members
A starting point for beginners to add UDL at their own pace	Training and institutional support	Disciplinary-specific support spaces
UDL efforts with clear direction		For faculty members to have the desire to make learning accessible
International Standard of Operation (ISO)		Learning spaces with support for faculty
More research on UDL, more studies between researchers and educations		
Simulation experiments of UDL		
Interdisciplinary research involving students in psychology		

Deductive Codes – EDI, UDL, SDT & WCAG Findings

To fill a gap in literature where, EDI, UDL, SDT, and WCAG appear not to have been researched all together, deductive codes were applied with all these concepts. Figure 6 shows the percentages of each type of deductive code tagged, UDL guidelines were tagged 46 times (38%), EDI codes were tagged 26 times (22%), SDT principles were tagged 28 times (23%), and WCAG was tagged 20 times (17%).

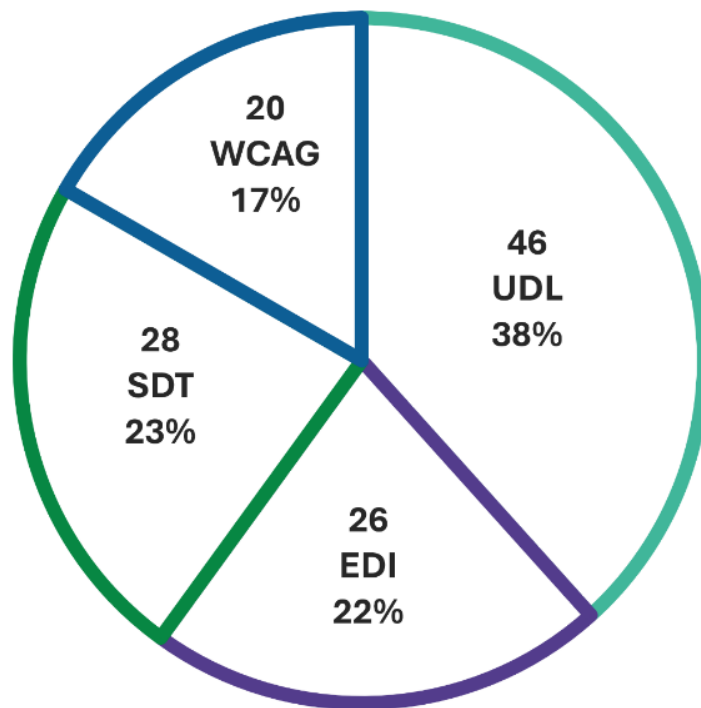
Figure 6*Distribution of Deductive Codes*

Table 16 presents the UDL codes with their code counts while Table 17 presents the EDI, SDT, and WCAG codes compiled with code counts.

Table 16*UDL Guideline Deductive Codes*

UDL Guidelines Deductive Codes (46)		
Engagement (12)	Representation (12)	Action & Expression (22)
Guideline 7: Welcoming Interests & Identities (6)	Guideline 1: Perception (6)	Guideline 4: Interaction (4)
7.1 Optimize choice and autonomy (2)	1.2 Support multiple ways to perceive information (1)	4.1 Vary and honor the methods for response, navigation, and movement (2)
7.2 Optimize relevance, value, and authenticity (2)	1.3 Represent a diversity of perspectives and identities in authentic ways (5)	4.2 Optimize access to accessible materials and assistive and accessible technologies and tools (2)
7.3 Nurture joy and play (1)		Guideline 5: Expression and communication (13)
7.4 Address biases, threats, and distractions (1)	Guideline 2: Language and Symbols (4)	5.1 Use multiple media for communication (5)
Guideline 8: Sustaining effort and persistence (5)	2.2 Support decoding of text, mathematical notation, and symbols (2)	5.2 Use multiple tools for construction, composition, and creativity (1)
8.1 Clarify the meaning and purpose of goals (1)	2.5 Illustrate through multiple media (2)	5.3 Build fluencies with graduated support for practice and performance (2)
8.3 Foster collaboration, interdependence, and collective learning (1)		5.4 Address biases related to modes of expression and communication (5)
8.4 Foster belonging and community (1)	Guideline 3: Building Knowledge (2)	Guideline 6: Strategy Development (5)
8.5 Offer action-oriented feedback (2)	3.3 Cultivate multiple ways of knowing and making meaning (1)	6.1 Set meaningful goals (1)
Guideline 9: Emotional Capacity (1)	3.4 Maximize transfer and generalization (1)	6.2 Anticipate and plan for challenges (1)
9.2 Develop awareness of self and others (1)		6.3 Organize information and resources (1)
		6.5 Challenge exclusionary practices (2)

Table 17*Deductive Code Categories (EDI, SDT, WCAG) and Code Counts*

Deductive Code Category	Codes and Code Counts	
EDI (26) Equity, Diversity, and Inclusion	Equity (9)	
	Diversity (2)	
	Inclusion (15)	
SDT (28) Self-Determination Theory	Autonomy (8)	
	Competency (7)	
	Relatedness (13)	
WCAG (20) Web Content Accessibility Guidelines	1. Perceivable (7)	3. Understandable (4)
	1.1 Text Alternatives (5)	3.1 Readable (3)
	1.2 Time-based Media (1)	3.2 Predictable (0)
	1.3 Adaptable (0)	3.3 Input Assistance (1)
	1.4 Distinguishable (1)	
	2. Operable (8)	4. Robust (1)
	2.1 Keyboard Accessible (3)	4.1 Compatible (1)
	2.2 Enough Time (2)	
	2.3 Seizures and Physical Reactions (0)	
	2.4 Navigable (2)	
	2.5 Input Modalities (1)	

Universal Design for Learning (UDL) Codes – Findings

UDL codes were applied 46 times throughout the transcript, excluding the Common UDL Jargon code. Action & Expression (A) was tagged 22 times (47.83%). Engagement (E) was tagged 12 times (26.09%), and Representation (R) was tagged 12 times (26.09%). The specific guideline distribution was somewhat dispersed amongst the principles. Figure 7 presents the distribution of UDL principles and Figure 8 presents the distribution of specific guidelines in participant implementation. All participants were included in this count.

Figure 7

Distribution of UDL Principles in Participant Implementation

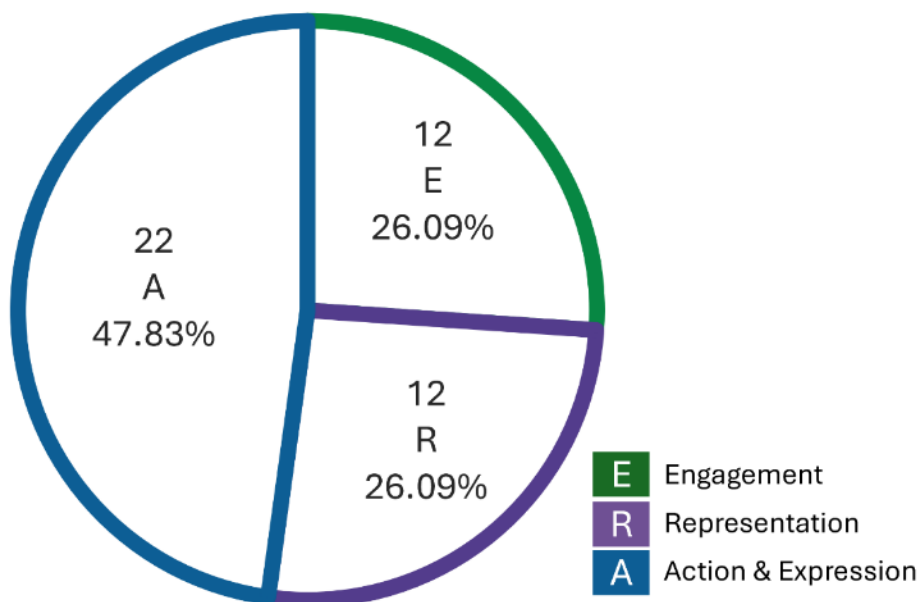


Figure 8

Distribution of UDL Guidelines in Participant Implementation

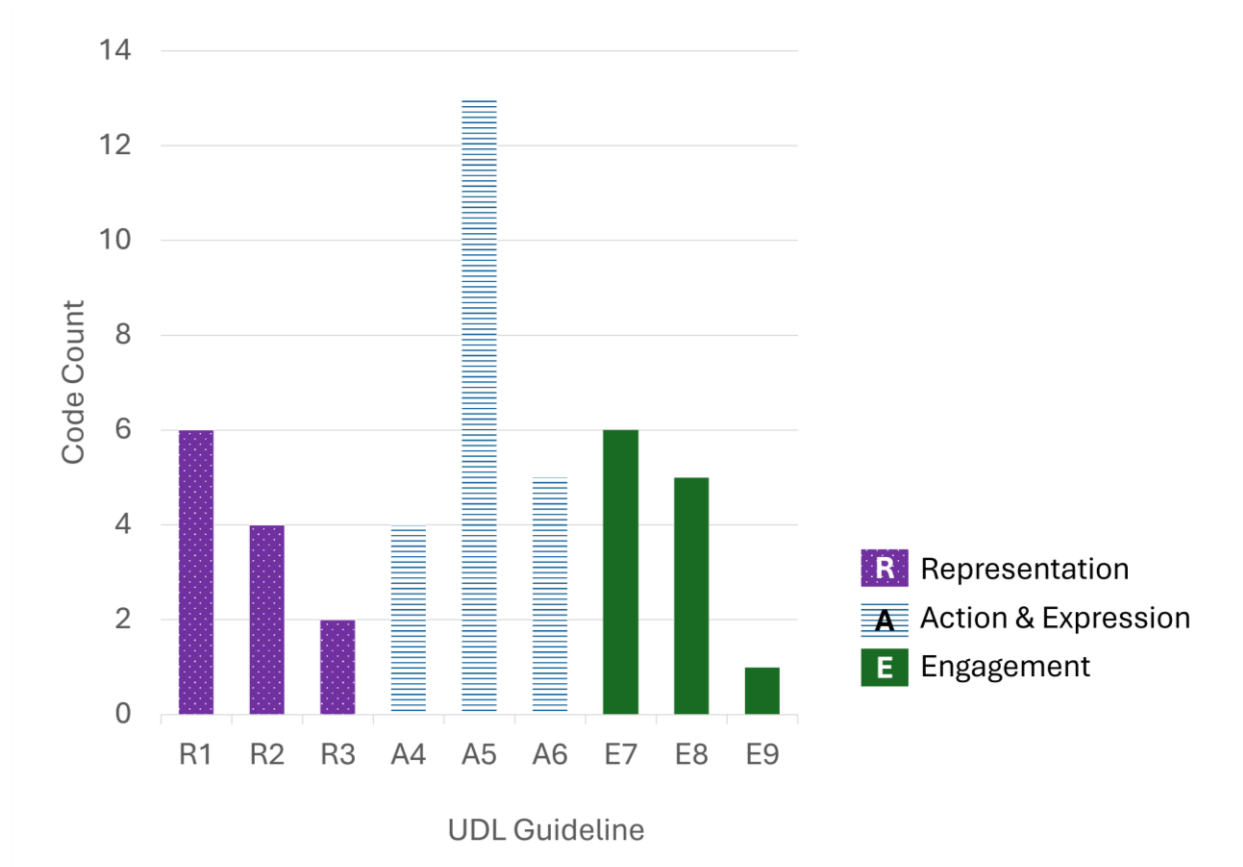


Table 18 presents examples of excerpts that were coded with UDL.

Table 18

UDL Codes with Participant Excerpt Examples

UDL Principle	UDL Guideline	Excerpt
Engagement	8.3	“We spend time, especially in the first few sessions, and return to it over and over throughout the semester, developing accessibility practices that everybody is a part of and establishing norms for that,”
Representation	6.3	“When it comes to UDL or recommendations in my online courses, what has worked or not, there’s really one thing I did. It was that I, of course, tried to speak in a way that is comprehensible.”
	6.3	“I wasn’t sure if I was applying the UDL principles or not, but by breaking down the tasks into very simple examples, I implemented the process in that way.”
Action & Expression	4.1, 4.2	“Say, PowerPoints, making sure that they’re developed accessibly to a screen reader. I use image description when I include images on slides. I try, and I’m not 100% perfect at it, but I make sure my PDFs are accessible by screen readers. I use a lot of those kinds of accessibility practices.”

Equity, Diversity, and Inclusion (EDI) Codes – Findings

EDI codes were applied 26 times within the transcript whenever a statement was made that evoked the concepts of equity, diversity, or inclusion. EDI codes were applied many weeks after the rest of the codes because the implications and significance of EDI emerged during the process of reporting the findings. Furthermore, following more research, the term EDI was adopted where previously, EDI was being used. Figure 7 presents that the distribution of EDI codes in the data is uneven. Out of 26 total tags, Equity was tagged 9 times (34%), Diversity was tagged 2 times (8%), and Inclusion was tagged 15 times (58%).

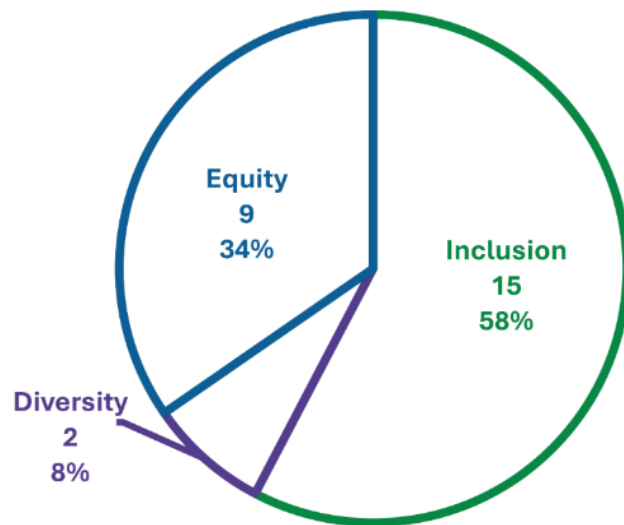
Figure 9*Distribution of EDI Codes*

Table 19 presents examples of excerpts that were coded with EDI.

Table 19*EDI Codes with Participant Excerpt Examples*

EDI Code	Excerpt
Equity	“I also previously spent a lot of time teaching teachers and using UDL as the foundation of how I taught them to create more equitable classrooms.”
Diversity	“I also believe—especially if we look at knowledge production from multiple marginalized people who haven’t had access to the academy—I like to center their work.”
Inclusion	“I don’t mandate cameras being turned on. I think that I encourage it and encourage it when students are sharing, but I try to understand the broad range of living experiences that students have. And I also always have the chat, encourage use of the chat.” "For me, I think, as P1 says, I think by the term Universal design for learning, it means it considers all the stakeholders of the education course. For example, the teachers and also the students. This design method includes all the characteristics that are needed to create a more inclusive and engaging learning experience. So that's what I actually understand about this term." “I really tried consciously to have a very neutral accent when I talked to students so that they could understand what I was talking about.”

Self-Determination Theory (SDT) Codes

Self-Determination Theory codes were applied 29 times to the transcript. Figure 10 presents the distribution of SDT codes by principles. Autonomy was tagged 8 times (27.6%), Relatedness was tagged 13 times (44.8%), and Competency was tagged 8 times (27.6%). Originally, SDT codes were only tagged 13 times, but when the project was coded for EDI, weeks after the original coding sessions, it was obvious that the SDT codes had to be re-done. Not enough codes had been applied to relevant excerpts, so the coding was done again, and the associated charts re-created for accuracy.

Figure 10

Distribution of SDT Codes by Principle

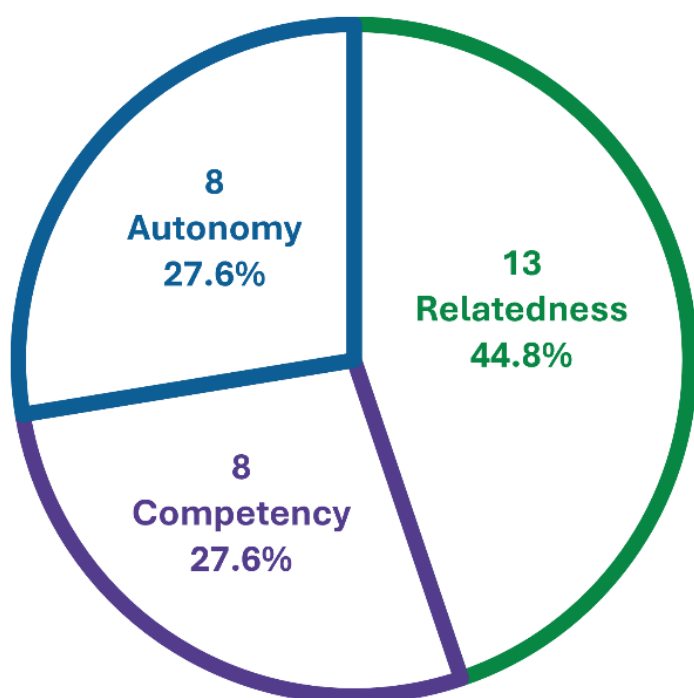


Table 20 presents examples of excerpts that were coded with SDT.

Table 20

SDT Codes with Participant Excerpt Examples

SDT Code	Excerpt
Autonomy	"I'm just happy to share quickly. For me, it means that I don't use a video unless it's captioned. I try to only use videos with captions and audio descriptions."
Competency	"Another aspect was sharing additional resources for their smooth learning. So, for example, I shared my notes and several other resources so they could learn the learning outcomes more accurately."

“I also made it a point that I would use the whiteboard because, for me, it was a tutorial, so it was all about solving problems. For me, it was always a white screen, and I would write on it, and I would talk.”

“..getting feedback to students, and the kind of feedback I like in a timely manner, has always been difficult for me.

I have a grad reader, which I’m grateful for, here for the first time—I didn’t have one at a previous institution. They help me with student grading and feedback, but I feel like that’s something that’s always been a challenge. I know with UDL, timely feedback and that kind of thing are super important.”

Relatedness

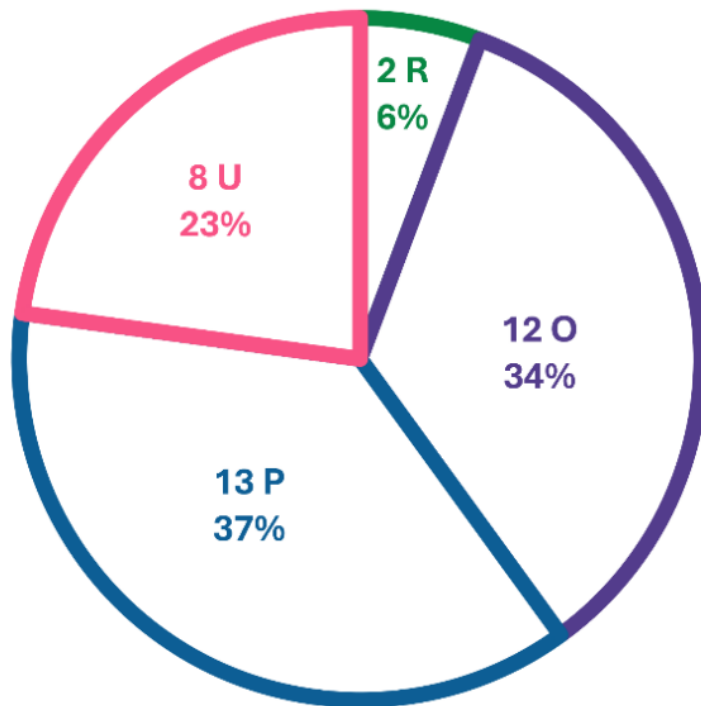
“I think by the term Universal design for learning, it means it considers all the stakeholders of the education course. For example, the teachers and also the students.”

Web Content Accessibility Guidelines (WCAG) Codes - Findings

Figure 11 presents the Web Content Accessibility Guidelines (WCAG) codes that were applied 35 times to the transcript. Perceivable (P) was tagged 13 times (37%), Operable (O) was tagged 12 times (34%), Understandable (U) was tagged 8 times (23%), and Robust (R) 2 times (6%).

Figure 11

Distribution of WCAG Codes by Guideline Category

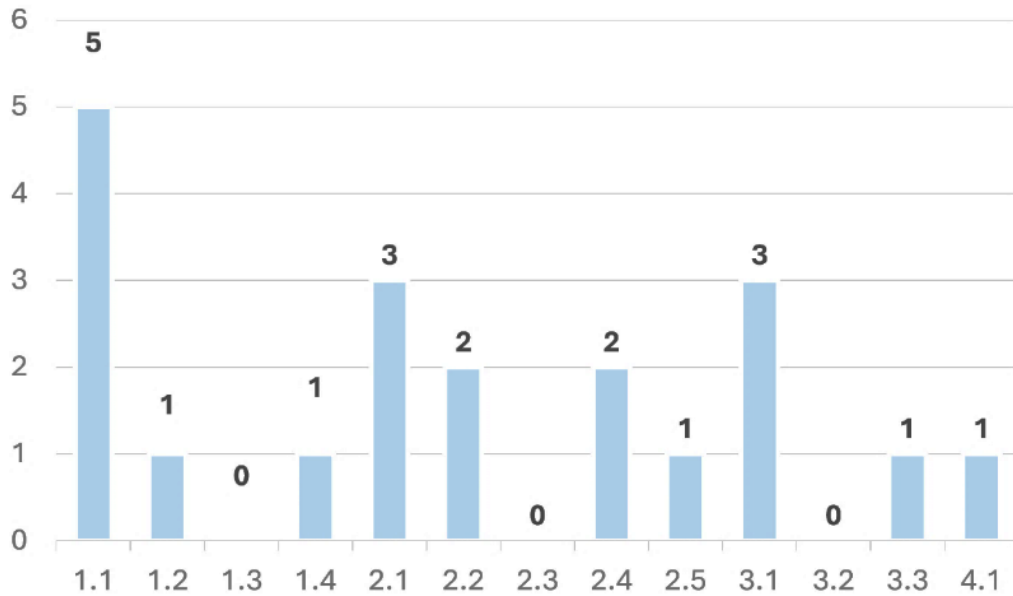


Note. P means Perceivable. O means Operable. U means Understandable. R means Robust.

Figure 12 presents the WCAG guideline applications divided by specific guideline.

Figure 12

Distribution of WCAG Codes by Specific Guideline



Note. Appendix N lists the specific guidelines and their definitions.

Table 21 presents examples of excerpts that were coded with WCAG.

Table 21

WCAG Codes with Participant Excerpt Examples

WCAG Guideline	Excerpt
Perceivable 1.1 Text Alternatives	"I'm just happy to share quickly. For me, it means that I don't use a video unless it's captioned. I try to only use videos with captions and audio descriptions." "PowerPoints, making sure that they're developed accessibly to a screen reader. I use image description when I include images on slides. I try, and I'm not 100% perfect at it, but I make sure my PDFs are accessible by screen readers. I use a lot of those kinds of accessibility practices."
Understandable 3.1 Readable	"Before the meeting started, I would make sure that I have the relevant symbols that are going to be used in problems already on the wide screen. That way, whenever I needed to use them, I could simply copy and paste them from there." "Communication is a big challenge here. To overcome this, I had to engage with them visually and also use more than one mode. I couldn't rely on just one mode of instruction. I had to apply multiple approaches, like supplying materials and telling them to read it well and discuss with me."

Chapter 5: Discussion

This chapter analyzes the key findings of this study, situating them within the context of the existing research and examining their broader significance. This chapter also covers the limitations of this study, suggestions for future research, and the conclusion.

Key Findings

The study identified several key findings in what faculty members in higher education know about Universal Design for Learning (UDL), how they add it to their online courses, and who the hierarchy of stakeholders are that are responsible for supporting faculty members with UDL.

Faculty Member Awareness – Key Findings

The majority of faculty members interviewed were not fully aware of UDL principles and had not received any formal training in it, however, they still implemented UDL principles in their courses by introducing methods that respond to UDL principles in their online courses unknowingly. This is consistent with existing research showing that many educators implement UDL guidelines without realizing (Hills et al., 2021; Kursch & Luo, 2023) sometimes simply because it is considered “good teaching” (Altowairiki, 2023). This study validates previous research findings adds insights on how cultural and educational background, and language impact awareness and implementation.

Cultural Background. “Bikram” mentioned that his Indian educational background shielded him from concepts such as UDL because the focus is on exams, grades, lab performance, and that the conversations focus on engineering. He said that “the Indian education is very exam focused” and that they “down to talk about design for learning which could be universal” he said they “mainly talk about engineering.” He also said that he only learned about UDL when he moved to Canada. This is consistent with the existing research on teacher preparedness on UDL in India (Bhat & Geelani, 2018; Das et al., 2013). Studies show that teacher training on inclusive educational practices is inadequate (Das et al., 2013; Bindal & Sharma, 2010). Studies mainly take place at the k-12 level and are focused on the aspects of accessibility that revolve around students with disabilities (Das et al., 2013; Bindal & Sharma, 2010; Bhat & Geelani, 2018). UDL, on the contrary, does not focus on disabilities, but instead on learner variabilities. However, since the classroom and assignment accommodations often overlap between disability studies and UDL (CAST, 2024), it is still interesting to note that in a survey of 349 teachers from 30 schools in New Delhi, 146 of them (67%) had not received any special education training, 41 (32%) had received some training, and 184 of them (86%) reported not having access to any support services for students with special needs (Das et al., 2013). The researchers indicated these gaps in faculty training support as potential reasons that the faculty members in the study had rated themselves as incompetent in most of the survey categories of educational skills such as goal setting, instructional techniques, and professional knowledge (Das et al., 2013). The study also compares itself to similar Western research where lack of knowledge and poor attitude towards change are shown to “impede the successful implementation of inclusive education programs,” (Das et al., 2013, p. 33; Scruggs & Mastropieri, 1996),

as well as influence entire school systems negatively, rendering them more resistant to change and implementation of new ideas (Das et al., 2013; Kuyini & Desai, 2007; Hargreaves, 1995; Phalen, 1996). In support of these findings, the participant “Claudia’s” educational background is North American, and she similarly expressed frustration that there was not more being done in the institutions where she taught. She expressed surprise that in the social sciences departments there was not more emphasis on UDL. A survey study of 225 participants assessing teacher knowledge on UDL in Saudi Arabia found similar results, that knowledge, attitude, and background play a role in implementation (Almutairi & Alsuwail, 2023).

Educational Background. “Bikram” also mentioned his Engineering background as a hindrance for UDL awareness. This statement reflects the variances that could exist in the different disciplines or departments of higher education. In a critical evaluation of inclusive practices in higher education, Stentiford & Koutsouris (2022) remarked that “when considering the connection between disciplinary domains and possible understandings of the inclusive curriculum, it follows that different disciplines will have different aims and purposes, with subsequent implications at the level of practice (i.e. teaching, curricula, assessment)” (p. 1254). They posit that depending on a person’s definition of “inclusion” it would make sense that certain fields, or disciplines, would be more inclusive than others because of their orientation towards social and constructivist philosophies (Stentiford & Koutsouris, 2020). According to some research, these philosophical tendencies are less common among the “hard” sciences such as physics and chemistry but often associated with “soft” disciplines such as English (Stentiford & Koutsouris, 2022; Neumann et al., 2002). A quote by “Claudia” supports this notion. She said, “I really promote and support engagement and learning. I’m sure some of that might be tied to what I teach, right, like I don’t teach a hard science or anything like that.”

“Culture of Access”. “Claudia’s” background in disability studies and social sciences seems to have had a positive influence on her knowledge and implementation of UDL, which is consistent with research indicating that training in inclusive practices leads to more effective implementation (Kirkpatrick et al, 2021; Altowairiki, 2023). She not only implemented many UDL practices into her online courses, as shown in Chapter 4, she even invented her own language for describing this inclusive environment. She calls this, “*culture of access*”. Within “Claudia’s” description of “*culture of access*”, UDL is not a way to improve grades, but instead, support engagement, learning, and relationships. In Table 10 in Chapter 4, “Claudia’s” “*culture of access*” accommodations are listed with the associated UDL guidelines.

Two interesting phenomena emerged related to “Claudia’s” “*culture of access*”. First, the naming itself of “*culture of access*” is representative not only of “Claudia’s” expertise, but also the significance and reliability of catch phrases, mnemonic devices, acronyms, and repetition used for remembering complex ideas or concepts in education. The effects of mnemonic devices and peer interaction are shown by exploring how another participant used “Claudia’s” catch phrase later on in the interview.

Mnemonics in Education. Mnemonics is a method of using words in a variety of ways such as catch phrases, rhymes, rules, diagrams, acrostics, acronyms, etc. that can be used to strengthen learning skills, assist with memory, and encoding new

information (Maheshwari, 2019). “Mnemonics helps you to increase memory by imposing sense, structure and organization on material,” (Maheshwari, 2019, p. 20). There are several types of devices such as name mnemonics where the first letter of each word is connected to make a word. An example would be BEDMAS, a common device used in mathematics to remember the order of operations, (Brackets, Exponents, Division, Multiplication, Addition, Subtraction) (Maheshwari, 2019). There are also keyword or catchphrase-style mnemonics that can be implemented to learn a new or innovative concept with vocabulary which is unfamiliar or industry-specific. These techniques help students remember complex concepts long term by using concrete and similar sounding words to construct relatable, tangible, and meaningful phrases (Maheshwari, 2019). “Claudia’s” “culture of access” is an example of a keyword mnemonic used by the participant to englobe several inclusive concepts together that she applies to her courses. It is also an example of the UDL guideline Representation, Building Knowledge, 3.4 Maximize transfer and generalization. This guideline recommends faculty members “Prompt the use of mnemonic strategies and devices (e.g., visual imagery, paraphrasing strategies, method of loci, etc.)” (CAST, 2024).

Peer Influence on Learning. It is interesting that “Claudia” created a mnemonic device to describe how she implements UDL principles with her students, but it is even more interesting that later in the interview, “Bikram” used “Claudia’s” term. He said,

What I was saying was, there's also this fact that, a lot of times, the faculty members that are there may or may not be of the opinion that because there was no such culture of access or stuff like that 30 or 40 years ago, you really have to adapt yourself.

This shows some evidence that transference can happen in as quickly as one hour of spending time with an expert who uses a mnemonic device. This also demonstrates the effects of involving peers in the development of faculty as they reflect on teaching. There is some research showing that pairing faculty peers together for teaching development initiatives helps them reflect on their practice, increases their confidence in implementing new strategies, enhances their awareness of student experience, and improves their practical teaching skills (Hammersley-Fletcher & Orsmond, 2005; Bell & Cooper, 2013; Hendry et al., 2014; Bell & Mladnovic, 2015; Barnard et al., 2011).

Understanding UDL Without Formal Training. Another interesting finding in this study that aligned with the broader research is that faculty members apply UDL principles without realizing it. They do not necessarily need to be formally trained in UDL to apply its guidelines in their courses because the principles are what faculty would call “good teaching,” (Altowairiki, 2023).

When asked what UDL means to them, two out of the three participants in this study categorized themselves as beginners in the demographic survey, yet they still understood some of its basic concepts. For example, “Bikram” said “Universal design for learning is a design for learning which is universal in the sense that it is the most inclusive that it could be. “Fahim” similarly expressed that for him “the term Universal design for learning, means it considers all the stakeholders of the education course”. He

said that “this design method includes all the characteristics that are needed to create a more inclusive and engaging learning experience”. “Claudia”, who identified as intermediate similarly responded “I think of UDL, online learning, and all kinds of learning. Yeah, as folks have said, using the words inclusive of all learners and, you know, trying to think of broad accessibility from the outset.” Right away we notice a pattern, not only in how the participants describe UDL as a method that includes everyone, but also, “Fahim” and “Claudia” both reference previous participants in their own explanations, showing a common basic understanding of the term. Even if “Bikram” and “Fahim” did not formally know about UDL, they still understood its basic principle of inclusivity, without any formal training in it. This is also reflected in the data. While participants expressed low levels of knowledge 11 times, and never specifically referred to a UDL guideline by name or number, they still made factual statements about UDL 18 times and used common UDL jargon 53 times, showing evidence that regardless of self-reported levels of knowledge, some awareness or understanding is present.

Table 22 presents examples of excerpts that were coded with Factual Statements on UDL.

Table 22

Factual Statements on UDL code with Participant Excerpt Examples

Participant	Excerpt
Bikram	“After each question, I would stop. I would ask people if there were any doubts, and sometimes people who had doubts asked their doubts, and we resolved them before moving on to the next question. I made it a point to always give this opportunity, to let students tell me or communicate to me that they had doubts or problems so that those doubts could be resolved before moving on to the next question.”
Claudia	“I try to really use my learning outcomes to drive assessment or graded activities all the time.”
Fahim	“I used very simple examples and scenarios so that they could understand the process. Because writing a research paper or formulating a research problem is not an easy task. So, in that way, I wanted to make it inclusive.”

The participants were not directly asked if or what they knew about the Plus-One Approach, and none of them mentioned it during the interview, yet, consistent with findings that faculty members understand UDL concepts without naming them, “Bikram” said, when referring to adding UDL to an online course, “little changes could have a big impact.” Furthermore, multiple times participants made statements where they expressed unconsciously applying UDL, such as “Fahim”, who said:

I used very simple examples and scenarios so that they could understand the process, [...] I wasn’t sure if I was applying the UDL principles or not, but by breaking down the tasks into very simple examples, I implemented the process in that way.

Then, when “Bikram” asked him if he was aware of UDL at that point, he responded with, “I don't think I was very much aware of this term UDL and its principles [...] maybe I was applying the principles of UDL unconsciously.” By coding the times that participants mentioned UDL principles and comparing to their own self-reported levels of UDL knowledge, and their anecdotes on their own UDL awareness, it is interesting to notice that it is not always necessary to know the formal or official concepts, frameworks, or guidelines, to naturally understand or apply them. “Fahim” said, “I didn’t know about the framework or the processes in detail. But yeah, I remember I heard of this term UDL quite a few times, but I’m not very familiar with the steps or procedures of it.” Both “Bikram” and “Fahim” mention having very little knowledge of UDL, however both implemented strategies in their courses to ensure good communication with students, clarity of the course materials, and multiple methods of representation, all strategies that can be found within the UDL guidelines. This is consistent with existing research asserting that while reported knowledge of UDL is low, there is still evidence that faculty members implement its practices without knowing the terminology (Izzo et al., 2008; Mavrovic-Glaser, 2017; Hills et al., 2022). This could stem from the popularity of Universal Design, the grandfather of UDL, or that the term Universal Design for Learning seems somewhat self-explanatory, or a multitude of other reasons. For example, from the 60s to the early 2000s, teaching methods were revolutionized by the Civil Rights Movement, and methods including student choice and agency became popularized (Rotter, 1960; Deci & Ryan, 2000). Furthermore, it is interesting that “Claudia” unconsciously applied UDL techniques in her behaviour when she asked “Bikram” to clarify how to pronounce his name, fostering a sense of belonging and community, reference to UDL principle 8.4 (Appendix A). Despite this interesting phenomenon, research suggests that implementation is more effective and more likely when faculty members are knowledgeable about UDL and properly supported to implement it (Kirkpatrick et al., 2021). One of the reasons could be that, as Tobin and Behling (2018) have found, one of the barriers of faculty members truly understanding the concepts and need for UDL is that they were often themselves successful students who thrived in the traditional academic system. Since UDL-style initiatives were mainly focused on students with learning disabilities in the past, Tobin and Behling (2018) remark that there is a disconnect between current faculty members because what worked for them may not work for a variety of their students. Recommendations to face these barriers are discussed in the section on Support.

Faculty Member Implementation of UDL – Key Findings

Whether consciously or not, participants made UDL implementations in their courses. None of the participants ever named specific guidelines by their name or number, however, a variety of guidelines were implemented. UDL implementation by faculty members occurred in ratios that were both consistent and contrasting with existing research. Tobin and Behling (2018), mentioned that often when faculty members start making their courses accessible, they focus on the technical aspects and less on the engagement or community aspects. They remarked that since very few faculty members have studied UDL in depth, they are likely to use a “rigid application of a few concepts,” (Tobin & Behling, 2018, p. 131), usually centering on technological adaptations, similar to the story told earlier about a faculty member and her teaching

assistant who spent a week making all their history videos accessible by adding captions and transcripts. When the specific accommodations implemented by all participants were tabulated and compared to UDL guidelines, the ratio was consistent with previous research (Hills et al., 2022; Kirsch et al., 2023; Rao et al., 2015; Tobin & Behling, 2018) where Action & Expression (or more physical or accessibility and assistive technology-based accommodations) were dominant. The strategies are highlighted based on their closest fit with a UDL guideline, Engagement in green [E], Representation in purple [R], Action & Expression blue [A]. Table 23 presents the implementations by all participants and the UDL guideline it is most related to.

Table 23*UDL Implementations by Participants and Related UDL Principle*

Implementations	Principle & Guideline
Adapt accent to be more neutral, to ensure students understand	R, 2
Assess student engagement and learning often	E, 8
Attribute equal weights to assessments	E, 7
Audio descriptions	A, 5
Break down longer tasks into shorter, easier tasks	R, 3
Center the work of marginalized people	R, 1
Don't mandate cameras being turned on	A, 5
Encourage students to use the chat	A, 5
Give time for questions between each example	R, 3
Image descriptions	A, 4
Learning outcomes drive assessments	A, 6
Learning outcomes that allow multiple demonstrations of knowledge	E, 7
Never give timed exams	A, 5
Not requiring big written paper	A, 5
PDFs accessible by screen reader	A, 4
PowerPoints accessible to screen reader	A, 4
Resolve any doubts before moving on to the next question	R, 3
Share resources and notes	R, 3
Understanding a broad range of student experiences	A, 5
Use journal articles, blogs, podcasts, first-person writing	A, 5
Use simple examples and scenarios to ensure students understand the process	R, 3
Use whiteboards to write main points and equations while speaking	A, 5
Videos with captions	A, 4

Note. Engagement in green [E], Representation in purple [R], Action & Expression blue [A].

If we compare all implementations used in this study to those in a similar study by Hills et al., (2022) with 205 faculty members, there is considerable overlap in the strategies used. Table 24 presents the implementations by participants in a similar study by Hills et al., (2022) with the associated guidelines. The accommodations with an Asterix (*) are those that differ from this study. Take home exams, alternatives to group work, and content or trigger warnings are the accommodations used by the participants in Hills et al., (2022) that were not used in this study.

Table 24*UDL Implementations in Study by Hills et al., (2022)¹*

Implementations	Principle & Guideline
Alternative text for images	A, 4
*Alternatives to groupwork	E, 7
Alternatives to oral presentations	E, 7
Choice in assessments or formats	E, 7
Closed captioning for video	A, 4
*Content or trigger warnings	E, 9
Documents that can be read with a screen-reader	A, 4
Extra time for exams	A, 5
Flexibility with deadlines	A, 5
Post course materials in advance	R, 3
Posting lecture recordings	R, 3
Share discussion questions ahead of time	R, 3
Students may record lectures	A, 5
*Take home exams	A, 5
Varied lecture delivery	A, 5
Variety in assessment	E, 7

Note. Engagement in green [E], Representation in purple [R], Action & Expression blue [A].

¹Hills, M., Overend, A., & Hildebrandt, S. (2022). Faculty perspectives on UDL: Exploring bridges and barriers for broader adoption in higher education. *The Canadian Journal for the Scholarship of Teaching and Learning*, 13(1). <https://doi.org/10.5206/cjsotlracea.2022.1.13588>

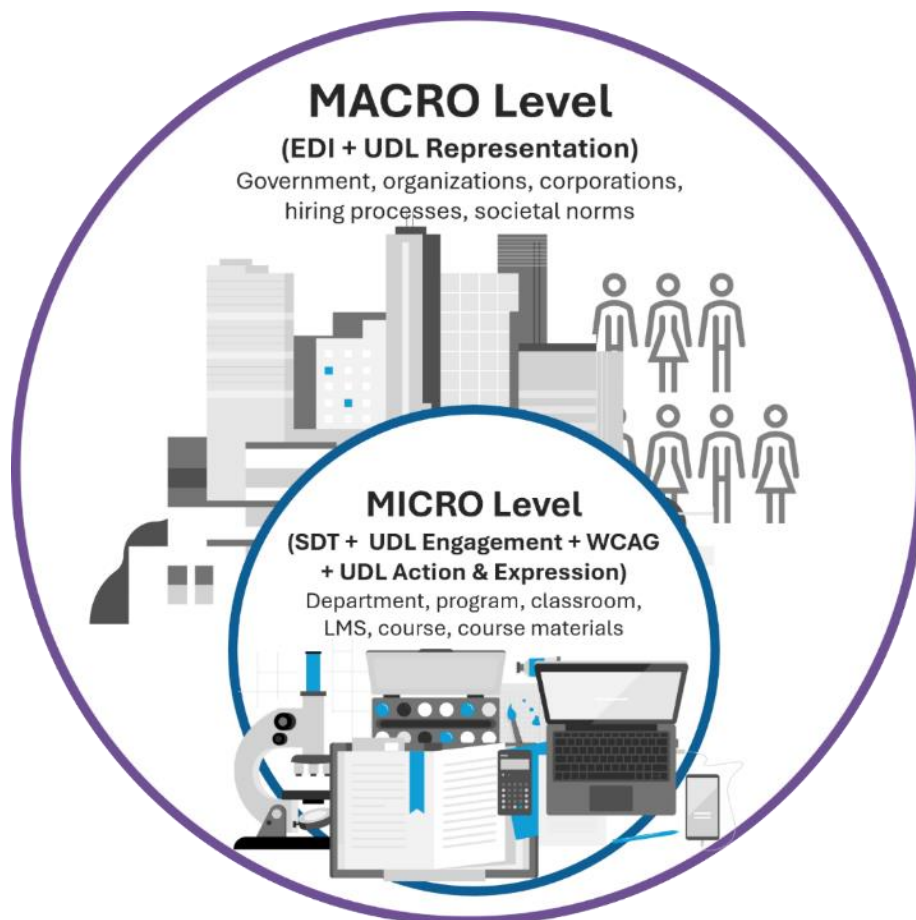
Similar to what Tobin and Behling (2018) reported, the main adaptations made for the courses were technical or related to action & expression. It is interesting to note that the percentages of UDL principles used in the implementations that were similar in both studies are not consistent (engagement in green E, representation purple R, action & expression blue A). Bray et al. (2023) contrarily, did a systematic literature review of UDL implementation in higher education and found that Engagement was the most used UDL principle by faculty members, notably, “where educators offer choice about how learners access content” (p. 113). A multitude of other studies list the implementations used by faculty members in their online courses. Consistent with the Hills et al., (2022) study, Westine et al., (2019) reported faculty use of UDL guidelines (Appendix Q). The study showed that Representation, 3 (building knowledge), and Action & Expression, 5 (Expression and Communication) were the most used guidelines. Note that the language used in that study was from the guidelines 2.0 where this paper uses guidelines 3.0. Consistent with the previous discussion, Westine et al., (2019) found that “interestingly, familiarity was not a requirement for faculty use, as up to 15% of faculty who reported using a guideline were also unfamiliar with it” (p. 30). Similarly, a survey by Das et al., (2014) showed that 73 faculty members used a variety of UDL methods, but most were unfamiliar with the framework before filling out the survey (p. 58).

Faculty Member Support for UDL – Key Findings

Faculty member support is the first step towards awareness and implementation (Izzo et al., 2008; Burgstahler, 2020). The CAST (2024) website explains that “educators face daily challenges in planning for diverse learners. However, learner variability is predictable, and [CAST has] developed prompts and principles to support educators – UDL Guidelines” (p. 1).

The problem is that gaining knowledge about and then implementing these guidelines is a challenge for faculty even if the guidelines themselves were designed to support faculty members. In reality, the support-web is larger than simply CAST/UDL to faculty members. Tobin and Behling (2018) found that faculty members mostly adapt their courses because “it’s the law” (p. 130). In their paper, *Adopt the Plus-One Approach*, they wrote, “people focus on a narrow part of the inclusive-design process, usually having to do with videos and captions, and they spend considerable time and effort fulfilling what they think is a legal mandate” (p. 130). This demonstrates a need for awareness on the Plus-One Approach, which promotes implementing UDL iteratively and choosing purposefully the types of accommodations that best suit the course objectives (Tobin & Behling, 2018), and a broader level of UDL implementation that reaches the principles of Engagement and Representation. Action & Expression accommodations are often related directly to course documents being accessible and allowing for multiple methods of submission in assignments, however, Engagement and Representation are more geared towards the wider view of education and learning (CAST, 2024). While UDL is shown to have a variety of student benefits (add a few sources), it is promoted and designed mainly to connect educators and learners together in a common vocabulary and with common best practices for inclusive learning experiences (CAST, 2024).

This study proposes a model that integrates UDL as part of a larger implementation that reaches multiple other levels. The classroom and learning benefits of students in this proposed model are an example of UDL applied at the micro-level of society. However, the proposition is that UDL can be applied also at the macro-level as shown in Figure 13.

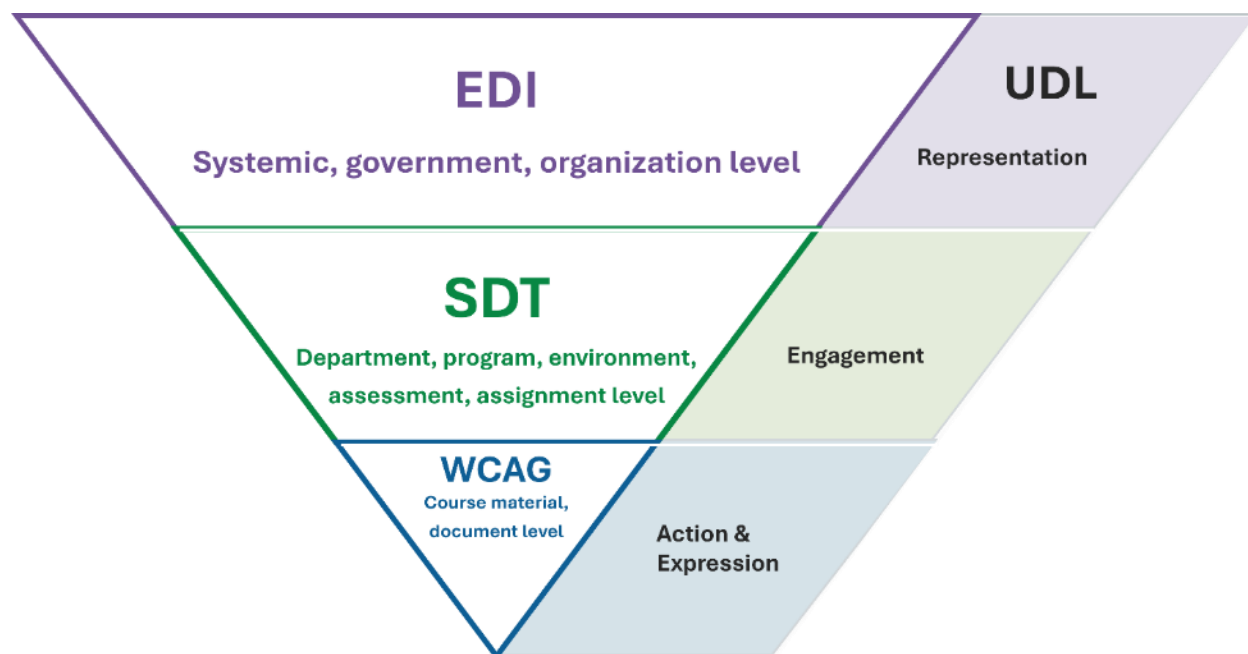
Figure 13*Macro and Micro Levels of UDL Application*

*An LMS is a Learning Management System, a website to host online courses

In conjunction with Equity, Diversity, and Inclusion (EDI), Self-Determination Theory (SDT), and the Web Content Accessibility Guidelines (WCAG), this model proposes that UDL principles can act to consolidate the frameworks and theories through the hierarchy presented in Figure 14 and through the psychological and conceptual constructs that combine them all. These constructs are examined as an overlapping matrix that shows how EDI, UDL, SDT, and WCAG all interact on different levels to promote inclusivity and accessibility at different levels of society.

Figure 14

UDL Interacting with EDI, SDT, WCAG as a Hierarchy of Support



First, on a systemic, governmental, organizational level, UDL (Representation) aligns with Equity, Diversity, and Inclusion (EDI). On a departmental, program, environment, and assessment and assignment level, UDL (Engagement) aligns with Self-Determination Theory (SDT), and at the course materials and documents level, UDL (Action & Expression) aligns with Web Content Accessibility Guidelines (WCAG).

Systemic Level (EDI, UDL – Representation). Studying the history and connections between UDL, EDI and other pro-humanitarian concepts brings attention to the social and political context in which they are able to be developed and implemented. To situate this study within a global and political context, it is more important than ever to continue research efforts in this domain. In June 2020, the Royal Society of Chemistry (RSC) established a joint commitment to action on EDI in academic publishing, recognizing that there were biases in representation. This initiative brought together universities and educational institutions all over the world to participate together in promoting inclusion and diversity in publishing (Dewidar et al., 2022; Royal Society of Chemistry, n.d.). However, as of 2025, EDI initiatives are being dismantled by government entities. For example, on January 2nd, 2025, the University of Alberta president Bill Flanagan announced that the university was going to shift away from EDI initiatives towards a new framework of “access, community and belonging” (University Affairs, 2025). Flanagan admitted the university made mistakes in its implementation of EDI and wants to correct it as many of the initiatives were perceived as performative and insulted different groups. However, as University Affairs (2025) explains, critics are saying the timing is unconvincing and argue that the current political climate

regarding EDI has influenced the decision (University Affaires, 2025). For example, an executive order received on January 20, 2025, by the current president of the United States of America, Donald Trump, repealed a previous order by Former President Joseph Biden that promoted EDI and accessibility (Biden, 2021). The new executive order stated that EDI initiatives were “illegal and immoral discrimination programs,” and announced that White House administration staff would “coordinate the termination of all discriminatory programs” such as EDI (The White House, 2025) (Access the full executive order in Appendix R). However, Jocelyn Samuels, former US equality chief, who was fired seven days after Donald Trump was inaugurated, said in an interview with *The Guardian*, “I think that this demonization of the term DEI is really misrepresenting the nature of the important work that needs to be done to really create a level playing field” (Samuels, 2025). Hughes (2021) proposes a legal system redesigned entirely using UDL guidelines with the goal of having a legal system that reflects the varied experiences and needs of all users. Hughes (2021) emphasizes that UDL is a process, not an end result, and that the governmental system needs to move beyond traditional norms to become more inclusive (Hughes, 2021). According to its definition, EDI ensures that organizations create fair and accessible environments by actively addressing systemic barriers, promoting representation, and fostering a culture of belonging for all individuals (Nittrouer et al., 2024). This aligns with the UDL principle Representation 1.3 Represent a diversity of perspectives and identities in authentic ways (CAST, 2024). Given the growing emphasis on accessibility and inclusive education (Luo & Kirsch, 2023; Izzo et al., 2008), UDL’s alignment with EDI highlights its implication in contemporary discussions on equitable learning environments (Fornauf & Erickson, 2020). However, unlike UDL, EDI initiatives are often added as an extra layer of accommodation or inclusion, which, according to Burgstahler (2020), is a step in the right direction, but still is limited compared to the proactive and up-front approach of the UDL framework. This is because educational institutions are shown to reach their equity goals of creating accessible learning environments more effectively when applying inclusive strategies from the start (Burgstahler, 2020). Furthermore, EDI initiatives often relate to systemic and structural issues implemented by administration staff as a broader category of improvements to educational institutions that are often beyond the control of course developers (Iniesto & Bossu, 2023).

Department Level (SDT, UDL – Engagement). When educational programs and assessments are being developed, studies show that students benefit from the sense of belonging that comes from inclusive environments. Self-Determination Theory, like EDI and UDL, can be associated to inclusive learning through the concept of Relatedness. Deci and Ryan (2000) stated, “SDT hypothesizes that [...] intrinsic motivation [is] more likely to flourish in contexts characterized by a sense of security and relatedness” (p. 71). The UDL principle of Engagement, 8.4 Foster belonging and community, connects the concepts through needs of belonging, connection, and inclusion. Furthermore, principle 7, Welcoming Interests & Identities, connects UDL to SDT through 7.1 Optimizing choice and autonomy, and SDT’s Autonomy. Deci and Ryan (2000) felt that students were more likely to show motivation to participate if they were given autonomy in how to demonstrate their learning and in their learning activities or projects. For example, students who get to choose their own topics, or choose how they want to present, whether orally or by writing an essay, demonstrated

more motivation towards assignments (Flanigan et al. 2023; Kirsch & Luo, 2023). Similarly, UDL's 7th principle has the same recommendations, allowing for freedom and agency in how to demonstrate knowledge (CAST, 2024). SDT can be used at the departmental level and course program level to design and develop learning environment and assessments that offer choice in evaluation method and learning activities (Ismailov & Chiu, 2022; Rosa et al., 2025). It can be used for providing clear program-wide learning objectives and supporting semester-long projects that are scaffolded by being divided into many smaller parts. To introduce relatedness at the program level, community and mentorship programs can be incorporated, as well as internships and guest speakers that bring in the real-world experience (Ismailov & Chiu, 2022; Rosa et al., 2025).

Course Materials Level (WCAG, UDL – Action & Expression). On a more technical level, Web Content Accessibility Guidelines (WCAG), are a set of guidelines that can be applied to documents, websites, and course content produced in authoring tools or posted online (World Wide Web Consortium [W3C], 2018). The purpose of WCAG is to allow users physical access online. What this means at the course material level is that documents such as Word documents, PDFs, or handouts can be read properly by a screen reader and accessed using a keyboard. Audios and videos have transcripts and/or captions. Visual contrast ratios are respected so text is legible on screen. Animations and movement can be paused and/or are not seizure inducing. Users have enough time to respond to prompts and timers can be paused (World Wide Web Consortium [W3C], 2018). These guidelines align with UDL principle, Action & Expression, 4 Interaction, 4.1 Vary and honor the methods for response, navigation, and movement, as well as 4.2 Optimize access to accessible materials and assistive and accessible technologies and tools.

Theoretical & Actionable Items Overlap. In the research goals, this study aims to bridge the gap in literature that exists where UDL, EDI, SDT, and WCAG have not been studied together. When overlapping all four concepts, there is an interesting hierarchy that develops. EDI can be used as the umbrella category, applied at the systemic, or organizational level. In government, in universities, in policy and law making. SDT can be used to develop programs, classrooms, in-person and digital through LMSes, and evaluation strategies for programs. WCAG, contrarily, can be used to make documents, websites, and course modules accessible, meaning it is used at the course material level. If we dig deeper into what this means on a more theoretical level, we can use descriptors to explain each concept and then examine how they overlap using a matrix. Table 25 presents the conceptual and theoretical descriptors used to explain UDL, EDI, SDT, and WCAG. Figure 15 presents the theoretical overlaps of EDI, UDL, SDT, and WCAG.

Table 25

Conceptual and Theoretical Descriptors

Descriptor	Definition
Systemic	Globally applied or organizational
Conceptual	Based on ideas
Theoretical	Based on theory, not practice
Psychological	Related to the mind and wellbeing
Technical	Specific methods applied through technology
Operable	Able to be used or applied
Practical	Offering concrete suggestions

Figure 15

Theoretical Overlap between UDL, EDI, SDT, and WCAG

UDL Systemic, conceptual, theoretical, psychological, technical, operable	UDL/WCAG Systemic, practical, technical, operable	WCAG Systemic, practical, technical, operable
UDL/EDI Systemic, conceptual, psychological, operable	UDL/EDI/SDT/WCAG Systemic, conceptual, theoretical, psychological, technical, practical, operable	WCAG/SDT Practical, operable
EDI Systemic, conceptual, psychological, operable	EDI/SDT Conceptual, psychological, operable	SDT Conceptual, theoretical, psychological, practical, operable
EDI/WCAG Systemic, operable		UDL/SDT Conceptual, theoretical, psychological, practical, operable

Note. Universal Design for Learning (UDL). Equity, Diversity, and Inclusion (EDI). Self-Determination Theory (SDT). Web Content Accessibility Guidelines (WCAG).

Where EDI is systemic, conceptual, psychological, and operable, SDT is conceptual, theoretical, psychological, practical, and operable, WCAG is systemic, practical, technical, and operable. UDL, interestingly, responds to all of these descriptors. If we take these descriptors and turn them into actionable items that can be easily understood, we can create a similar overlapping matrix showing that UDL encompasses many of the same items as EDI, SDT, and WCAG. Figure 16 presents the actionable items overlap between all four concepts.

Figure 16*Actionable Items Overlap between EDI, UDL, SDT, and WCAG*

EDI •Representation in leadership or materials used •Equity in opportunities • Safety and belonging •Laws that promote inclusion	EDI/SDT •Representation in leadership or materials used •Equity in opportunities •Safety and belonging	SDT •Safety and belonging •Physical accessibility of documents, websites, apps, environments •Multiple modes of representation and submission
UDL/EDI •Representation in leadership or materials used •Equity in opportunities • Safety and belonging •Framework for application and change	UDL •Physical accessibility of documents, websites, apps, environments •Safety and belonging •Representation in leadership or materials used •Equity in opportunities •Multiple modes of representation and submission •Framework for application and change	UDL/WCAG/SDT •Physical accessibility of documents, websites, apps, environments •Safety and belonging •Multiple modes of representation and submission
EDI/WCAG • Laws that promote inclusion	WCAG •Physical accessibility of documents, websites, apps, environments •Multiple modes of representation and submission • Laws that promote inclusion	UDL/WCAG •Physical accessibility of documents, websites, apps, environments •Multiple modes of representation and submission

Note. Universal Design for Learning (UDL). Equity, Diversity, and Inclusion (EDI). Self-Determination Theory (SDT). Web Content Accessibility Guidelines (WCAG).

The only item that does not feature in the UDL center box of the matrix is “laws that promote inclusion” but implementing UDL fully would be beyond the strict application of the current laws promoting inclusivity, therefore, although it does not formally line up with the item, it still responds to its criteria.

Comparing the UDL guidelines directly with each level reveals that the guidelines are direct representations of the EDI, SDT, and WCAG concepts. Figure 17 represents the UDL guidelines associated to each concept. Within EDI and the UDL principle Representation, Equity is related to supporting multiple ways to perceive information (UDL 1.2), because equity in EDI is about ensuring everyone is accounted for, and the UDL guideline ensures equal access to information for all. Access to information is the baseline for knowledge. Diversity is related to representing a diversity of perspectives and identities in authentic way (UDL 1.3), because both show clear advocacy towards representation in identity in order to widen understanding of lived experiences and realize that no perspective should be less valid or less valued (CAST, 2024). Inclusion is related both to cultivating understanding and respect across languages and dialects (UDL 2.3) and cultivating multiple ways of knowing and making meaning (UDL 3.3) since both guidelines are about creating inclusive spaces that promote acceptance. Within SDT, and the UDL principle Engagement, the concepts of Autonomy, Competency, and Relatedness are present in the UDL guidelines as well. Autonomy is related to optimizing choice and autonomy (UDL 7.1) because both are about flexibility, choice, and independence as a learner. Competency relates to

clarifying the meaning and purpose of goals (8.1) because both emphasize goal setting, clear paths and directions, encouraging long term and short term goals, co-constructing ideals of excellence, and sustaining effort through prompts and imagining desired outcomes (CAST, 2024). Relatedness is similar to the UDL guideline foster belonging and community (UDL 8.4) because both focus on the social aspect of learning, like sharing with peers and developing relationships that are meaningful with intersecting identities (CAST, 2024). For WCAG, and the UDL principle of Action & Expression, perceivable means it can be accessed, either through text or audio, and all interfaces are properly navigable, same as the UDL guideline to vary and honor the methods for response, navigation, and movement (UDL 4.1). Optimizing access to accessible materials and assistive technologies and tools (UDL 4.2) is directly related to the WCAG concept of operability because both emphasize keyboard, screen reader, and other types of access that are aided by technology. Understanding is related to using multiple tools for construction, composition, and creativity (UDL 5.2) in that they both strive for knowledge building and meaning making through a variety of methods to achieve competency. Robust is related to setting meaningful goals (UDL 6.1) because for any product or experience to respond to the criteria of robustness, or timelessness, staying relevant and usable, there is a need to develop those concepts by establishing the purpose, timeline, and scope.

Figure 17

UDL Guidelines related to EDI, SDT, WCAG in Detail

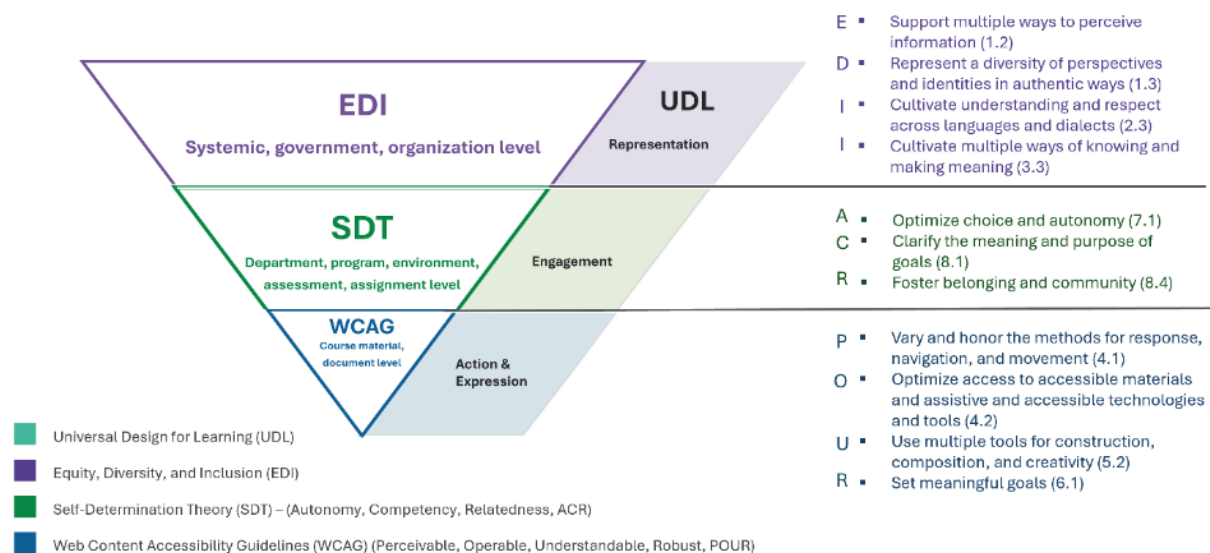


Table 26 presents the support requests made by the participants in this study as reported in Chapter 4 next to their related UDL principle. The results are that participants mostly require help at the systemic and institutional levels (Representation & Engagement).

Table 26*Faculty Member Support Requests with Related UDL Guideline*

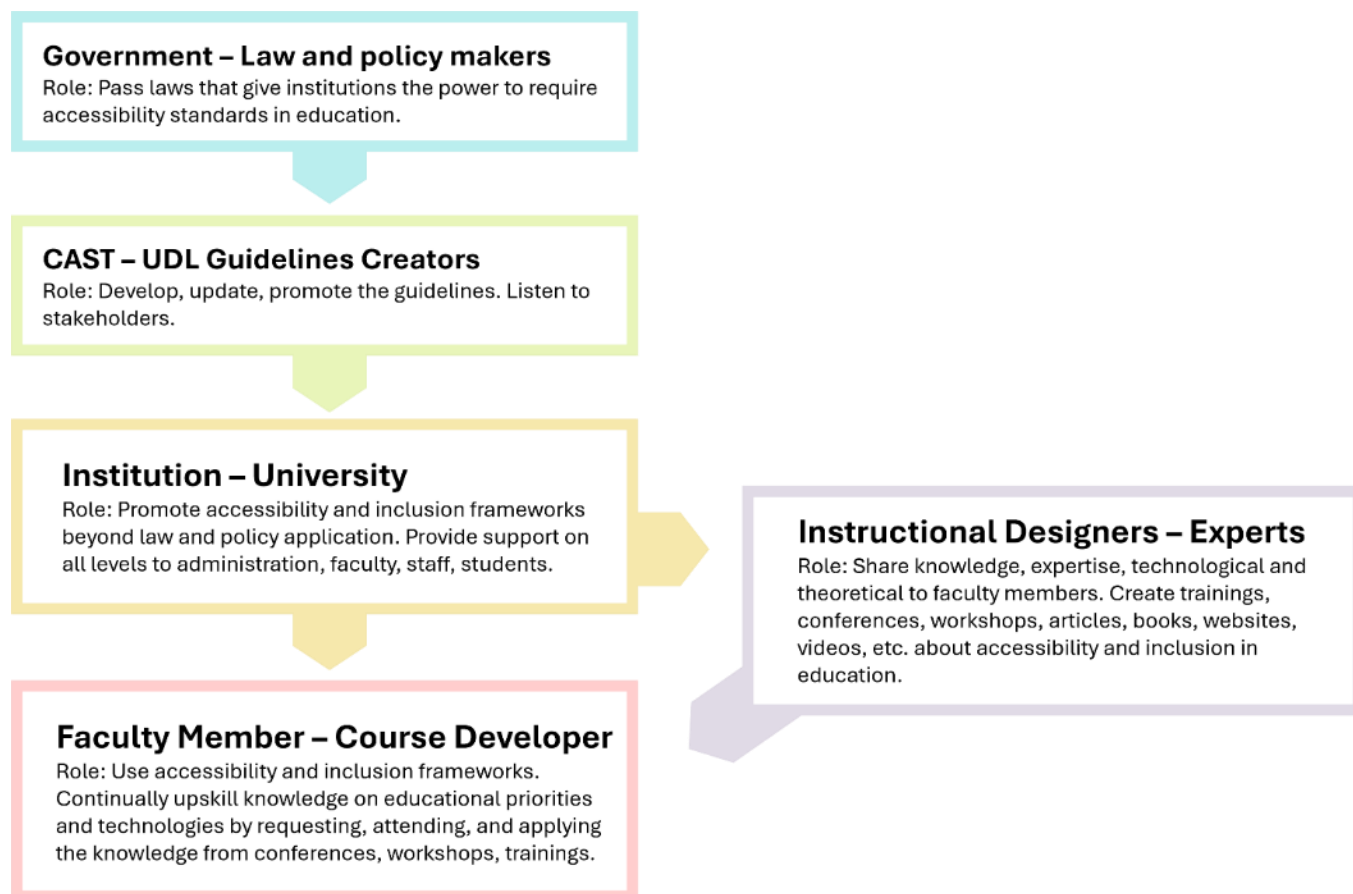
Support Request	Related UDL Guideline
Clear guidelines	E, 8.1
Training and institutional support	E, 8.5
Framing a set of clear guidelines (i.e. 10 simple mandatory points to apply)	A, 6.1
A starting point for beginners to add UDL at their own pace	E, 8.5
UDL efforts with clear direction	E, 8.1
International Standard of Operation (ISO)	R, 3.4
More research on UDL, more studies between researchers and educations	E, 7.2
Simulation experiments of UDL	E, 7.2
Interdisciplinary research involving students in psychology	E, 8.3
For faculty members to have the desire to make learning accessible	E, 9.1
Learning spaces with support for faculty	E, 8.4
Disciplinary-specific support spaces	E, 8.4
Disability spaces on campus for faculty members	E, 8.4

Note. Engagement in green [E], Representation in purple [R], Action & Expression blue [A].

This demonstrates a need for support at these levels. Furthermore, research shows that most implementation and support focus on course documents and media (Tobin & Behlin, 2018) or WCAG, UDL Action & Expression. If we examine the different stakeholders that play a role in the support of faculty members gaining knowledge and assistance in implementing UDL, there is an interesting hierarchy of roles. At the systemic level, support can be applied through EDI initiatives or through the lens of UDL through the following guideline: 1.3 Represent a diversity of perspectives and identities in authentic ways.

This guideline suggests that people should see themselves and others reflected in course curriculums, materials, and media to foster validation, belonging, and appreciation of diverse perspectives. Without representation, they may feel excluded or view their experiences as the only norm. Exposure to different identities, cultures, and histories helps prevent misconceptions and broadens understanding. At the systemic level, the government can achieve this through law and policy makers who have the responsibility to pass laws that give institutions the power and funding to make accessibility in education part of the standards. They also have a responsibility to be innately representative by adopting EDI and UDL initiatives at the core, from every level of government and administration. Organizations like the Center for Applied Science and Technology (CAST), the original developers of UDL, have the role of updating and promoting the guidelines, as well as listening to the various stakeholder

input they receive and implement it to continuously improve the guidelines. A good example of this was mentioned earlier when they changed the wording and reoriented the language to be directed towards learners and educators alike (CAST, 2024). Faculty members, on the other hand, can achieve this at their own level by including authors from diverse backgrounds, recognize contributions from various cultures, ensure accurate and respectful portrayals, challenge stereotypes, seek authentic representations, and create opportunities for engaging with different perspectives. At the program, and classroom level, Self-Determination Theory and UDL can both be adopted to create inclusive environments through the UDL guidelines: 8.3 Foster collaboration, interdependence, and collective learning, 8.4 Foster belonging and community, 7.1 Optimize choice and autonomy, 7.2 Optimize relevance, value, and authenticity. These guidelines collectively suggest strong relationships through community, connection and relatedness through relevance and authenticity, and autonomy or choice, all of which reflect the SDT principles of Autonomy and Relatedness. Institutions and universities have the role of promoting accessibility frameworks, such as UDL, beyond the laws and policy, meaning that they should go above and beyond and not just adhere to the strict minimum. This means providing support on all levels to administration, faculty, staff, and students. An example would be to provide funding for, to support, promote and applaud internal initiatives such as workshops, conferences, and access to experts, to endorse UDL-style frameworks at the core. When referring to experts, an example is instructional designers. Their role is to share technical and theoretical knowledge with faculty members. They are experts in designing and disseminating trainings, workshops, conferences, articles, books, websites, videos, and other media about accessibility and inclusion in education (Beirne & Romanoski, 2018). At this level, faculty members can develop practices such as “Claudia’s” “*culture of access*” that promote healthy communication and acceptance in the classroom. Finally, at the course development and course materials level, faculty members have the responsibility of making accessible resources. They also have a role in their own learning, as they have to continually improve their knowledge on educational priorities and technologies by requesting, attending, and applying the knowledge from conferences, workshops, and trainings on frameworks such as UDL. Figure 18 presents a summary of the stakeholders and their roles on a diagram with each level having its own responsibilities, revealing that from one level to the other, they serve each other and help each other. Students used to be at the bottom of the model as active partners in their own learning, responsible to request, recommend, and be vocal about accommodations and needs, but UDL prevents that by making all courses and course materials accessible innately, without putting the onus on students to do anything but learn (CAST, 2024, FAQ page)

Figure 18*UDL Support Stakeholders and their Roles***Limitations and Recommendations for Future Research**

This section details the limitations and lessons learned of this study. It then suggests some recommendations for future research.

Limitations in this Study

Limitations in this study include having only three participants instead of the recommended four to ten (Morgan, 1996). Although four to ten participants can rarely represent a population, three is even less representative. However, this study is exploratory, so I focused on depth instead of breadth, examining deeply the few participants that I did have. The study also took place in one university in one Canadian city, limiting the findings greatly due to its precise context. Furthermore, only faculty members were interviewed. Other important stakeholders in UDL implementation such as university administration, instructional designers, or students were not studied due to the scope of this research. Another limitation was that participants were not meant to have any knowledge of UDL prior to the interview, however, the second interview question asked them if they had added UDL to their courses. Since awareness was shown to be a factor in implementation, it may have skewed the data here. In a similar

study by Hills et al., (2022), they simplified the language of UDL guidelines and asked the participants which of the implementations they had done. This ensured that prior UDL knowledge did not skew the data on which UDL guidelines they implemented because they were simply checking off a list of things they had done (i.e. share notes and resources ahead of time or give extensive feedback). Since two out of three of the participants in this study identified as beginners in terms of UDL knowledge, the data collected on how they implemented UDL may be wrong. If they had been given a list of UDL guidelines as simplified language, they may have checked off many more things, or implemented a lot more UDL guidelines, than they said in the interview. This is an interesting avenue for future research. To replicate the Hills et al., (2022) study with other participants and evaluate if the ratios of implementation are similar.

Lessons Learned in Data Collection and Analysis

During the interview process, I was conscious that my personality is naturally very expressive, so I intentionally remained neutral as to not encourage the participants' answers to skew in one direction or another. The participants were told at the start of the interview that I tend to be expressive, so I would purposefully stay impartial for the interview, and to not view it as a sign of coldness or disinterest, but that it was to mitigate introducing biases by encouraging or discouraging certain answers. This proved to be difficult for me as a UDL enthusiast who gets excited hearing people discuss UDL, but I was able to stay stoic during the entire interview process. Throughout the coding process, I remained conscious of my potential biases. For example, my familiarity with UDL and online course design may have influenced the way I interpreted certain statements. To mitigate this bias, I took several weeks to code, taking pauses between coding sessions and reviewing my codes multiple times. Ideally, I would have had a peer review of my codes to blindly code my data, however, due to the scope of this master's thesis, this was not possible. During the writing of Chapter 4, Findings, I spent a lot of time analyzing the data from my own thoughts, ideas, and perspectives, forgetting that it needed to be related back to existing research. Not only did I put a lot of subjective interpretations into them, but I had also not performed a literature review of some of the information that arose during coding, so I was unfamiliar with the associated research. As a new researcher, I also wrote a lot of subjective interpretive and opinionated ideas regarding the data I was reporting. Before moving onto Chapter 5, Discussion, I went over the study sent to me from my advisor as an example and realized not only that I had gone "off the wagon" with my subjectivity, but also that I had not related it to the literature and done all my discussing in the wrong chapter. This brought me to re-writing chapter 4 entirely, pushing all my wild ideas to a separate document and starting over while reporting only what my interview data had generated. Again, before moving on to Chapter 5, Discussion, I wanted to go back and re-write my literature review. During one of my Reading Courses in 2022, I wrote a major literature review covering over 80 UDL-related sources, which contained a lot of interesting information about faculty member awareness, challenges, implementation, support methods, and relationships with instructional designers, however, the sources were outdated. It was crucial to find many more recent sources as UDL is a hot topic and the literature has been growing exponentially. Furthermore, the topic of my previous literature review centered neurodivergent students in higher education, a subject I have strayed away from as it is

a conflict of interest to me as an autistic graduate student with ADHD. Instead, I have focused faculty members in higher education, a population that I had not yet studied in depth, and although I have interacted with them a lot through the years as a student and at my job as an instructional designer, I do not identify with this population (yet). It also contained no mentions of EDI, SDT, or WCAG, which eventually became pivotal to my study. As a new researcher, the coding process was, for lack of a better term, brutal. At first, I felt overwhelmed by the transcript. Then, as I began using Dedoose, I had a lot of trouble using the program and found very little support. The YouTube videos I found were long, complex, and often extremely specific to types of data analysis, and I could really have used an expert who could help me. In the end, I figured it out and coded my data. After coding my data the first time, I realized that it was done wrong. I had coded very general ideas, or “themes”. I basically skipped over first-level coding. I went back and coded again, using very detailed words that described the specific actions or ideas being spoken. After coding a second time, I realized I had not reflected on my research questions. After a well deserved forehead slap, I coded again, using each of my research questions as a guide. During the reporting of my findings, I was glad that I had coded everything so diligently, however, I realized that by coding categories and sub-themes, I had overlapping data that I had sometimes forgotten to match up (i.e. When tagging the code “factual state of UDL” I was also tagging “Awareness”). This meant that during the reporting stage, a lot of my numbers did not always match up. I had to examine each tag and ensure I had not missed anything before reporting my final numbers and creating my visuals. Multiple times I found discrepancies in the numbers and had to “*go back to the data*” as I would say out loud to myself, and diligently re-code to ensure proper alignment. I re-wrote my literature review after coding. This was only partially a mistake; I should have done it before. I was glad that I had not looked into faculty members and UDL too deeply because that would have influenced my inductive coding, but if I had looked more deeply into what *other* ideas line up with UDL, I would have found EDI, and SDT earlier in the process. I was very familiar with UDL from the start, and WCAG, but EDI and especially SDT were more foreign to me. When I did my first pass of deductive codes, I did not code for EDI at all, this happened much later in the process, but I did code for UDL, WCAG, and SDT. The problem is that *after* doing my new literature review, I was so much better informed on all of these concepts that my coding felt weak. I had to re-do the SDT codes entirely. Then as I was writing about my WCAG findings, I started questioning my coding and noticed errors there too and re-did it. Now, I decided to write this entire section about data analysis reflection because I was just writing about how the participants used UDL principles in different distributions and remembered that my Chapter 4 reported a majority of Action & Expression, but when I lined up all the accommodations they had implemented in their online courses, there was a clearly different distribution. I “*went back to the data*” again and re-coded the UDL principles. I found that instead of action & expression dominating, actually representation was. Lastly, I had to re-do all my tables because I designed them as fancy graphics and when I started filling out the data, I ended up re-coding UDL once again, and action & expression were dominant again.

During my data analysis, one of the more revealing findings resulted from the recognition that my own biases as a white Canadian, raised in a liberal environment who studied in a Design program with values aligning with EDI and Sustainability, had

blinded me to my privilege when it comes to knowing about and implementing UDL. I grossly underestimated the role of culture and educational background in UDL awareness and implementation which became an important theme in the discussion.

Recommendations for Future Research

The findings reported regarding cultural background and how it affects UDL implementation are interesting paths for future research. One participant mentioned altering his accent to suit his students' needs. This statement shows a concerning effect of colonization on what is considered proper education or what is deemed understandable, opening the doors for studies on subjects relating to identity erasure and the limit of accommodations. One participant mentioned a "*culture of access*", a mnemonic device of the participant's own creation. These types of language adaptations, formations, and evolutions in education show promising research in the field of memory and simplification of complex information. Lastly, as the proposed model of hierarchical responsibilities is new, more research for alignment and possible empirical testing is needed to confirm its accuracy and relevancy.

Conclusion

In conclusion, this study has contributed to the understanding of awareness, implementation, and support of Universal Design for Learning (UDL) by faculty members in higher education in online courses. By investigating their descriptions, implementation, and support knowledge and needs related to UDL, the findings reveal that awareness to UDL is a major barrier to its implementation. Findings were consistent with existing research on this topic, as well as with the phenomena that faculty members implement UDL in their courses even without any formal knowledge or training of it. The study emphasizes the importance of cultural and educational background in UDL awareness and implementation, as well as the significance of language, words, and peer interactions. Culture and educational background can act as a hindrance to UDL knowledge and implementation, whereas language, words, and peer interactions can be catalysts towards deeper understanding and knowledge. Implementation of UDL by participants was consistent with existing research, showing that UDL guidelines have an uneven distribution of implementation in higher education. This study was consistent with research indicating that Action & Expression is the most implemented guideline (Tobin & Behling, 2018). The results showed that some faculty members need more discipline-specific learning spaces, and want clear instructions, guidance, and support at the institutional level.

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Appendix A

Universal Design for Learning (UDL) Graphic Organizers Versions 2.0 & 3.0

Figure A1 version 2.0

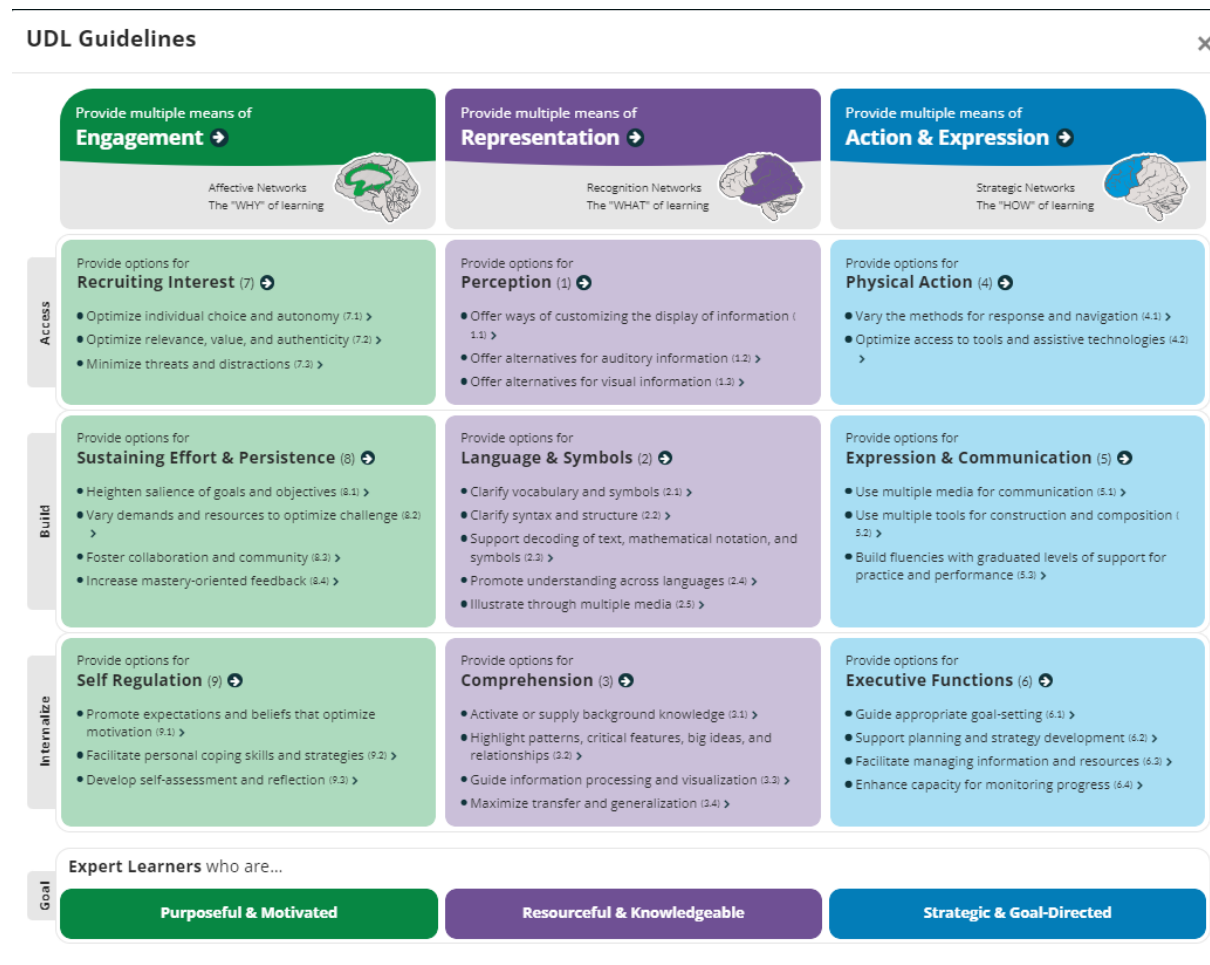


Figure A2 Version 3.0, launched July 30, 2024.



Appendix B

Comparing UID, UDL, and UDI

Table A1

Comparing Universal Instructional Design, Universal Design for Learning, and Universal Design of Instruction

Application of UD to online learning

Although UD is often referenced as a model to create inclusive teaching and learning environments, the application of UD principles to actual course design is not

Table 1. Universal design educational frameworks.

Framework	Main Principles Associated with Framework
UID: Universal Instructional Design (Goff & Higbee, 2008)	(a) Creating welcoming classrooms (b) Determining essential components of a course (c) Communicating clear expectations (d) Providing timely and constructive feedback (e) Exploring use of natural supports for learning, including technology (f) Designing teaching methods that consider diverse learning styles, abilities, ways of knowing, and previous experience and background knowledge (g) Creating multiple ways for students to demonstrate their knowledge (h) Promoting interaction among and between faculty and students
UDL: Universal Design for Learning (National Centre on Universal Design for Learning, 2010)	Principle I. Provide Multiple Means of Representation Principle II. Provide Multiple Means of Action and Expression Principle III. Provide Multiple Means of Engagement
UDI: Universal Design of Instruction (Burgstahler, 2009)	(1) Class climate (2) Interaction (3) Physical environments and products (4) Delivery methods (5) Information resources and technology. (6) Feedback (7) Assessment (8) Accommodation

Appendix C

UDL Principles, Explanations, and Recommendations

Table A2

Universal Design for Learning Guidelines and Recommendations

Principle and Guideline	Description	Recommendations
Engagement, Welcoming Interests & Identities (7), Optimize choice and autonomy (7.1)	Embedding authentic choices that align with learning goals can be a meaningful way to enhance learner engagement. Depending upon the learning goal, choices can be offered in how the goal can be pursued, such as the context for achieving the goal or the tools or supports available. Offering learners choices can develop agency, pride in accomplishment, and increase connection to their learning. However, it is important to note that individuals differ in how much and what kind of choices they prefer to have. It is therefore not enough to simply provide choice. Options for choice and autonomy must be optimized to ensure engagement.	Embed choices that align with the learning goal, such as: - The content to explore - The tools used for exploration or production - The type of rewards or recognition available - The opportunities for practicing and assessing learning - The design or graphics of layouts, etc. - The sequence or timing for completion of tasks Use a collaborative approach among learners and educators to co-design learning goals, activities, and tasks.
Representation, Cultivate multiple ways of knowing and making meaning (3.3)	Equitable learning environments guide learners in the process of constructing knowledge by valuing and cultivating multiple ways of knowing and making meaning. Diverse cultural perspectives bring unique insights and methods of understanding the world. Indigenous knowledge systems, for instance, emphasize holistic and interconnected ways of knowing, which can complement and enrich Western methodologies. By incorporating and respecting these various approaches, education can become more inclusive and effective. This broad approach helps in creating a more inclusive educational environment that respects and utilizes the diverse backgrounds of every learner.	Incorporate multiple ways of knowing, including storytelling, kinesthetics, problem solving, and relational learning through interpersonal experiences. Use explicit prompts for each step in a sequential process to help learners develop a logical flow specific for their understanding and create a structure of complex tasks. Use options for organizational methods and approaches (e.g., tables and algorithms for processing mathematical operations), supporting the various cognitive approaches and enhancing comprehension. Use interactive models that guide exploration and new understandings.

	Well-designed learning materials and environments incorporate multiple approaches to building knowledge, including but not limited to problem solving, storytelling, algorithms, and holistic and linear thinking. Incorporating multiple ways for meaning making, along with embedding models, scaffolds, and feedback, can assist learners in knowing how to apply different approaches and use those strategies effectively.	Introduce graduated scaffolds that support information processing strategies. Provide multiple entry points to a lesson and optional pathways through content (e.g., exploring big ideas through dramatic works, arts and literature, film, and media). “Chunk” information into smaller elements, helping to prevent cognitive overload. Progressively release information (e.g., sequential highlighting). Remove unnecessary distractions unless they are essential to the instructional goal.
Action & Expression, Optimize access to accessible materials and assistive and accessible technologies and tools (4.2)	The use of accessible materials and assistive and accessible technologies and tools strengthens opportunities for every learner to experience access, participation, and progress in the learning process. Increasingly accessible technologies are built into the devices many learners already own and use. Similarly, it has become more common for authoring tools to include options for creating accessible content at the point of need, rather than by acquiring them from a publisher or other external source. Providing a learner with a tool is often not enough. We need to provide the support to use the tool effectively. Oftentimes, learners may need assistance in navigating through their environment (both in terms of physical space and the curriculum), and every learner	Ensure navigation and interaction can be performed with a variety of tools, including keyboard, mouse, switch devices, and voice commands. Offer the ability to leverage alternate keyboard commands for mouse action. Use access to alternative keyboards (e.g., on-screen keyboards for touchscreens). Customize overlays for touch screens and keyboards. Select software that works seamlessly with keyboard alternatives.

should be given the opportunity to use tools that might help them meet the goal of full access and participation in the learning environment. However, significant numbers of learners with disabilities use assistive technologies for navigation, interaction, and composition on a regular basis. It is critical that instructional technologies and curricula are accessible and do not impose inadvertent barriers to the use of these assistive technologies. It is also important, however, to ensure that making a lesson physically accessible does not inadvertently reduce the challenge associated with the learning goal.

Appendix D

Faculty Familiarity with UDL Guidelines from Westine et al., (2019)

Table A3

Faculty Familiarity With Specific UDL Guidelines

Guidelines	Familiarity	
	<i>n</i>	%
1: Perception	84	59.6
2: Language, mathematical expressions, and symbols	53	37.6
3: Comprehension	71	50.4
4: Physical action	61	43.3
5: Expression and communication	85	60.3
6: Executive function	55	39.0
7: Recruiting interest	57	40.4
8: Sustaining effort and persistence	56	39.7
9: Self-regulation	67	47.5
Not familiar with any guidelines	40	28.4

Note. Guidelines 1-3 represent the principle of multiple means for representation, guidelines 4-6 represent the principle of multiple means for action and expression and guidelines 7-9 represent the principle for multiple means for engagement.

Appendix E

Barriers to UDL Awareness from Hills et al., (2022)

Table A4

Faculty Identified Barriers to Broader UDL Implementation (n=205)

Barrier to UDL Implementation	Percent of Faculty (%)
Time/workload constraints	62.0
Knowledge/Awareness of UDL	43.4
Institutional barriers (a lack of support)	24.4
Lack of opportunity to learn about UDL	17.6
I don't want to (i.e., I am pedagogically or ideologically opposed and/or I don't perceive value in doing this)	10.2

Appendix F

Faculty Implementation of UDL in Hills et al., (2022)

Table A5

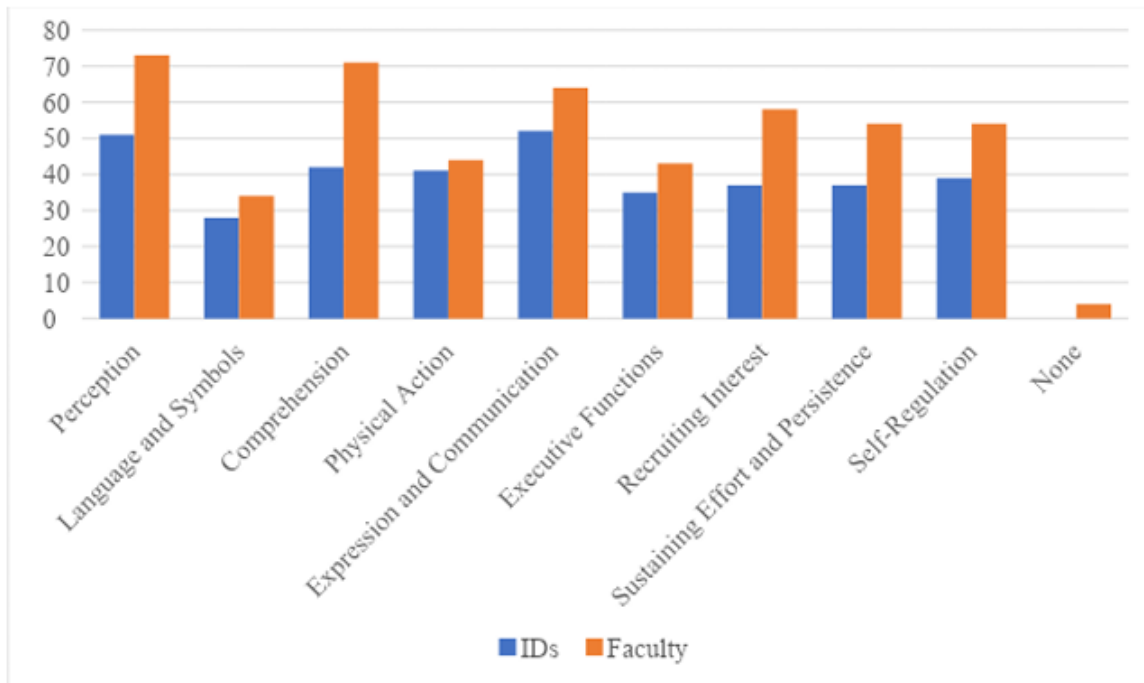
Faculty Identified Implementation of Common UDL Practices (n=205)

UDL Practice	Percent of Faculty that Implement (%)
Post course materials in advance	74.9
Variety in assessment	71.9
Varied lecture delivery	66.0
Flexibility with deadlines	50.2
Students may record lectures	48.8
Alternative text for images	44.8
Share discussion questions ahead of time	43.8
Content or trigger warnings	36.0
Extra time for exams	34.5
Choice in assessments or formats	29.1
Alternatives to groupwork	26.6
Alternatives to oral presentations	26.1
Take home exams	25.1
Documents that can be read with a screen-reader	21.7
Closed captioning for video	20.2
Posting lecture recordings	10.8

Appendix G
**Faculty and Instructional Designer UDL Implementation in Kirsch
 & Luo, (2023)**

Table A6

UDL Guidelines Used in Teaching or Work



Note. Participants could select multiple guidelines. Bar charts portray participant counts for each guideline.

Appendix H

Faculty Member Challenges in Implementing UDL from Kirsch & Luo, (2023)

Table A7

Challenges	Number of mentions
Lacking time	IDs: 36; Faculty: 67
Complexity of the framework	IDs: 22; Faculty: 34
Faculty attitudes	IDs: 29; Faculty: 18
Needing training	IDs: 16; Faculty: 20
Lacking technology	IDs: 11; Faculty: 12
Lacking supports in place	IDs: 14; Faculty: 7
Campus	IDs: 7; Faculty: 13
Lacking resources/money	IDs: 5; Faculty: 11
Students	IDs: 4; Faculty: 8
Other	IDs: 4; Faculty: 4
UDL not eliminating the need for accommodations	IDs: 2; Faculty: 5
Sustaining implementation	IDs: 1; Faculty: 3
Challenge-free environment supports in place	IDs: 14; Faculty: 7

Appendix I

Recruitment Efforts

Email to faculty members

Recruitment Email

Subject: Invitation to Participate in a Research Study on Universal Design for Learning in Online Courses

Dear [Participant's Name],

I hope this email finds you well. My name is Emmy Huot, and I am a researcher at Concordia University in the Educational Technology department. I am writing to invite you to participate in a research study focused on the implementation of Universal Design for Learning (UDL) in online courses.

If you fit the following criteria, you may be a good fit for this research study!

1. You created or designed content for online course delivery between 2018-2023
2. You created or designed content in one or more of the following formats: text, audio, video, assessments, documents
3. You are willing to participate in a group interview and be recorded

Your expertise and insights would be invaluable to our study, as we aim to better understand how faculty members and instructional designers work together to add UDL to their courses. We believe that your unique perspective and experiences could greatly contribute to the success of this research, regardless of your experience level with UDL. Furthermore, if you have any peers or colleagues that you feel would make appropriate participants for this study, please forward them this invitation, ask them to contact me at the contact information listed below, or give me their contact information if they consent and I will send them a personalized invitation to participate.

Here are some key details about the study:

Purpose: This research study investigates how faculty members and instructional designers work together to add UDL to their online courses.

Your Role: If you choose to participate, you will be asked to share your experiences and opinions regarding the integration of UDL in online courses through a focus group interview that will last approximately 1 hour conducted on Zoom. Your input will be treated with confidentiality, and your time and schedule will be respected.

Benefits: By participating in this study, you will contribute to the advancement of inclusive online education and help shape future practices in the field. Additionally, you will gain insights into the latest developments in UDL and online course design.

Voluntary Participation: Your participation in this study is entirely voluntary, and you are free to withdraw at any time without any consequences. Your decision will not affect your relationship with KnowledgeONE, eConcordia, or Concordia University.

If you are willing to participate or have any questions about the study, please do not hesitate to contact me by replying to this email or by phone at 514-652-5624. I would be more than happy to provide further information and address any concerns you may have.

Thank you for considering this invitation, and I look forward to the possibility of working together on this research endeavor.

Warm regards,

Emmy Huot

Lead eLearning Technologies

eConcordia, KnowledgeONE

Reminder Email

Subject: Reminder - Invitation to Participate in a Research Study on Universal Design for Learning in Online Courses

Dear [Participant's Name],

I hope this email finds you well. My name is Emmy Huot, and I am a researcher at Concordia University in the Educational Technology department. I am writing to remind you that you were invited to participate in a research study focused on the implementation of Universal Design for Learning (UDL) in online courses.

Your expertise and insights would be invaluable to our study, as we aim to better understand how faculty members and instructional designers work together to add UDL to their courses. We believe that your unique perspective and experiences could greatly contribute to the success of this research, regardless of your experience level with UDL.

Here are some key details about the study:

Purpose: This research study investigates how faculty members and instructional designers work together to add UDL to their online courses.

Your Role: If you choose to participate, you will be asked to share your experiences and opinions regarding the integration of UDL in online courses through a focus group interview that will last approximately 1 hour conducted on Zoom. Your input will be treated with confidentiality, and your time and schedule will be respected.

Benefits: By participating in this study, you will contribute to the advancement of inclusive online education and help shape future practices in the field. Additionally, you will gain insights into the latest developments in UDL and online course design.

Voluntary Participation: Your participation in this study is entirely voluntary, and you are free to withdraw at any time without any consequences. Your decision will not affect your relationship with KnowledgeONE, eConcordia, or Concordia University.

If you are willing to participate or have any questions about the study, please do not hesitate to contact me by replying to this email or by phone at 514-652-5624. I would be more than happy to provide further information and address any concerns you may have.

Thank you for considering this invitation, and I look forward to the possibility of working together on this research endeavor.

Warm regards,

Emmy Huot

Lead eLearning Technologies

eConcordia

Social Media Post

Faculty members in higher education who have taught courses online, here is your chance to help a master's student who wants to help other students! 💖
Please participate in my study on universal design for learning in higher education in online courses.
It's happening on Zoom, online, this Tuesday, November 19th, 7pm, Montreal time. It lasts about 1 hour.

Message me, comment, or email me
at Emmyhuot@gmail.com if you want to participate.



Appendix J
Ethics Certificate



**CERTIFICATION OF ETHICAL ACCEPTABILITY
FOR RESEARCH INVOLVING HUMAN SUBJECTS**

Name of Applicant: Emmanuelle Gosselin-Huot
Department: Faculty of Arts and Science\Education
Agency: N/A
Title of Project: Proposal for a Study on Universal Design for Learning
in Higher Education Online
Certification Number: 30019643

Valid From: January 14, 2025 To: January 13, 2026

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

A handwritten signature in black ink, reading "Richard DeMont".

Dr. Richard DeMont, Chair, University Human Research Ethics Committee

Appendix K

Consent Form

INFORMATION AND CONSENT FORM

Study Title: Study on Universal Design for Learning in Higher Education Online

Researcher: Emmy Huot

Researcher's Contact Information:

Phone: 514-652-5624

E-mail: emmyhuot@gmail.com

Supervisor : Dr. Giuliana Cucinelli

E-Mail: giuliana.cucinelli@concordia.ca

You are being invited to participate in the research project mentioned above. This form provides information about what participating would mean. Please read it carefully before deciding if you want to participate or not. If there is anything you do not understand, or if you want more information, please ask the researcher.

A. PURPOSE

The purpose of the study is to develop a better understanding of how faculty members work together to include Universal Design for Learning (UDL) in their online courses.

B. PROCEDURE

If you participate, you will be asked to present yourself at a Zoom meeting for 1 hour with four or five other participants where you will be recorded. You will be asked five questions and be given about 15 to 20 minutes to discuss as a group for each question. You will be given a 5 minute break around the middle of the interview. Each participant will have a turn to respond, and then a discussion will be had around the participant responses. You will be asked to validate your answers once the transcript of the interview is generated to ensure you agree and accept what you said.

Once the data is analyzed, a report will be created to answer a series of research questions.

Once the report is finalized and the research study is finished, the data will be archived on the researcher's personal computer, which no one else has access to but the researcher as it is password protected. The archived data will

The data will be archived instead of destroyed in case any inquiry is made by Concordia on the integrity of the research report. If the data needs to be accessed by anyone other than the researcher after the submission of the final report, the researcher will inform the participants of who is accessing the data and request their consent to give access to the data.

The archived data will be anonymized, meaning that any identifying data, names, course names, course mentions, course numbers, will be removed from the data.

After 5 years, the data will be destroyed by overwriting it with blank files.

C. RISKS AND BENEFITS

You might face certain risks by participating in this project because your interview will be published online and will be available in both digital and printed form for the duration of the project, after which the documentation will be archived offline. That's why the researcher is asking you to review and approve your case before publication.

Risks during the interview include fatigue, potential discomfort at being judged by colleagues who are also present at the focus group, not being able to remain anonymous due to it being a focus group with multiple participants, the potential of feeling judged or evaluated by the researcher.

Furthermore, it is important to note that the researcher's role as an instructional designer at eConcordia could feel like a risk because they have prior access to the course materials, instructor profiles, and other sensitive documents like collaboration agreements and analysis documents for all the courses.

To mitigate the risk of interference with the researcher knowing information about the faculty member that they would not know if they didn't work at eConcordia, the researcher will use the public online Concordia course catalogue to find potential candidate and reach out to them, this way they will have the same access as any other person.

To help minimize the risk of faculty members feeling judged by their colleagues, the researcher kept the questions very general and open-ended, and will avoid any facial expressions or gestures that would make anyone uncomfortable. If the situation between participants becomes dangerous for anyone, the researcher will stop the interview immediately and contact the ethics board and my supervisor.

To minimize fatigue, the researcher will not have many questions in the interview, allow participants time to respond, think, and have some silence between questions to breathe, allow the participants a 5-minute break at an appropriate time in the interview (not in the middle of a good discussion but at a time where people look drained).

Potential benefits include a better collaboration between instructional designers and faculty members and a better understanding of adding UDL to online courses.

D. CONFIDENTIALITY

Your name and professional title will be changed for anonymity, however, some of your peers may be present in the interview, therefore they may be aware of your answers.

[] I accept that the information I provide be used anonymously in the interviewer's thesis and academic publications.

F. CONDITIONS OF PARTICIPATION

You do not have to participate in this interview. It is purely your decision. If you do participate, you can withdraw at any time. You can also ask that the information you provided not be used, and your choice will be respected.

If you participate in the interview and survey and the transcript is sent to you for review, you will have until February 15, 2025 to withdraw or amend any statements, after which the researcher will use the data in the report. Your name and any identifying information will never appear to anyone but the researcher and the other participants.

If you withdraw from the study but you were already recorded on Zoom, the recording of you will not be destroyed for 5 years, but the transcript of anything you said will be overwritten, and anything you said or added to the conversation will be ignored. The video of you will be blurred out as best as possible and the sound cut if possible. There are no guarantees of the

quality of the erasure in the video, however, the video will not be part of the final report, therefore, it will not be seen by anyone but the researcher.

There are no negative consequences for not participating, stopping in the middle, or asking not to use your information.

G. VERIFICATION OF DATA

Please indicate how you prefer to be contacted if the researcher needs to validate the data or to share some results with you:

☐ By phone _____

☐ By email _____

H. PARTICIPANT'S DECLARATION

I have read and understood this form. I have had the chance to ask questions and any questions have been answered. I agree to participate in this research under the conditions described.

NAME (please print)

SIGNATURE

DATE

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Appendix L

Interview Questions

1. What does “Universal Design for Learning (UDL)” mean for you when it comes to creating online courses?
2. What is your experience with adding UDL in your online courses? If any.
3. What has worked in the past for you when it comes to UDL or accommodations in your online courses?
4. What has **not** worked in the past for you when it comes to UDL or accommodations in your online courses?
5. What resources relating to UDL do you know about?
Can you name them?
Do you have examples?
How did you hear about them?
6. What can be done to further support you as a faculty member to add UDL to your online courses?

Appendix M
Demographic Survey

Question	Descriptor
What is your gender?	Man Woman Prefer not to say Other (specify)
What is your age range?	18-25 26-35 36-45 46-55 56-65 65+
In your opinion, what is your current level of knowledge of UDL?	No knowledge Beginner Intermediate Advanced Expert
What have you taught in higher education? Select all that apply.	Humanities Fine Arts Applied Sciences Natural Sciences Social Sciences Business Other (specify)
How many years of experience do you have teaching in higher education?	0 1-4 5-9 10+
How many courses have you taught online?	0 1-4 5-9 10+

Appendix N
WCAG Guidelines Related to Online Learning

1. Perceivable

- 1.1 Text Alternatives: Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols, or simpler language.
- 1.2 Time-based Media: Provide alternatives for time-based media.
- 1.3 Adaptable: Create content that can be presented in different ways (for example, simpler layout) without losing information or structure.
- 1.4 Distinguishable: Make it easier for users to see and hear content, including separating foreground from background.
- 2. Operable
 - 2.1 Keyboard Accessible: Make all functionality available from a keyboard.
 - 2.2 Enough Time: Provide users enough time to read and use content.
 - 2.3 Seizures and Physical Reactions: Do not design content in a way that is known to cause seizures or physical reactions.
 - 2.4 Navigable: Provide ways to help users navigate, find content, and determine where they are.
 - 2.5 Input Modalities: Make it easier for users to operate functionality through various inputs beyond the keyboard.
- 3. Understandable
 - 3.1 Readable: Make text content readable and understandable.
 - 3.2 Predictable: Make web pages appear and operate in predictable ways.
 - 3.3 Input Assistance: Help users avoid and correct mistakes.
- 4. Robust
 - 4.1 Compatible: Maximize compatibility with current and future user agents, including assistive technologies.

Appendix O

Definitions of Themes & Sub-Themes

Theme	Sub-Theme	Definition
RQ1 Describing UDL Awareness	Awareness	References to participants' knowledge, understanding, or recognition of a concept, issue, or process.
	Feelings	Mentions of emotions, personal reactions, or affective responses related to the topic.
RQ2 Describing UDL Implementation	Implementation	Descriptions of actions taken, strategies used, or experiences related to putting a concept or practice into action.
	Students	Any mention of students, their experiences, perspectives, or behaviors in relation to the topic.
RQ3 Challenges with UDL	Challenge Awareness	References to recognizing difficulties, obstacles, or barriers that impact the topic under discussion.
	Challenge Communication	Mentions of difficulties in expressing, explaining, or discussing the topic, including misunderstandings or lack of clarity.
RQ4 Support for UDL	Support Existing	Descriptions of current resources, structures, or assistance already in place to help with the topic.
	Support Needed	References to gaps, missing resources, or additional support that participants believe is necessary.
Participant Interactions	Related to Participant	Mentions of personal experiences, perspectives, or contextual factors specific to the participant.

Appendix P

Word Cloud Details

accessibility	Disability Services		
accessibility	disability services		
accessibility	discriminates		
accessibility	engagement		
accessibility	engagement		
accessible	engaging	Grouped by	
accessible	engaging	meaning /	
accessible	engaging		
accessible	equitable	eliminating	
accessible	executive functioning	redundancy	
accessible	feedback		
accessibly	feedback		
accommodate	feedback		
accommodation	guidelines		
accommodation	inclusive		
accommodation	inclusive		
accommodations	inclusive		
accommodations	inclusive		
allotted timeframe	marginalized people		
captioned	more than one mode		
captions	neurodivergent		
communicate	screen reader		
communicating	screen readers		
communication	support needs		
communication	timely feedback		
demonstrate knowledge	visual descriptions		



accessible	13
accommodation	6
captions	2
communication	5
demonstrate knowledge	1
disability services	2
discriminates	1
engagement	5
equitable	1
executive functioning	1
feedback	3
guidelines	1
inclusive	4
marginalized people	1
more than one mode	1
neurodivergent	1
screen reader	2
support needs	1
timely feedback	1
visual descriptions	1

Appendix Q

Faculty Use of UDL Guidelines in Online Course Design

Faculty Use of UDL Guidelines in Online Course Design

Guideline	<i>n</i>	% ^a	% familiar with the UDL guideline ^b	% not familiar with the UDL guideline ^b
1: Perception	55	55.0	85.5	14.5
2: Language, mathematical expressions, and symbols	38	38.8	94.7	5.3
3: Comprehension	67	69.8	85.1	14.9
4: Physical action	40	42.1	87.5	12.5
5: Expression and communication	61	64.9	86.9	13.1
6: Executive function	42	46.2	90.5	9.5
7: Recruiting interest	44	48.4	93.2	6.8
8: Sustaining effort and persistence	45	50.6	95.6	4.4
9: Self-regulation	48	53.9	93.8	6.3

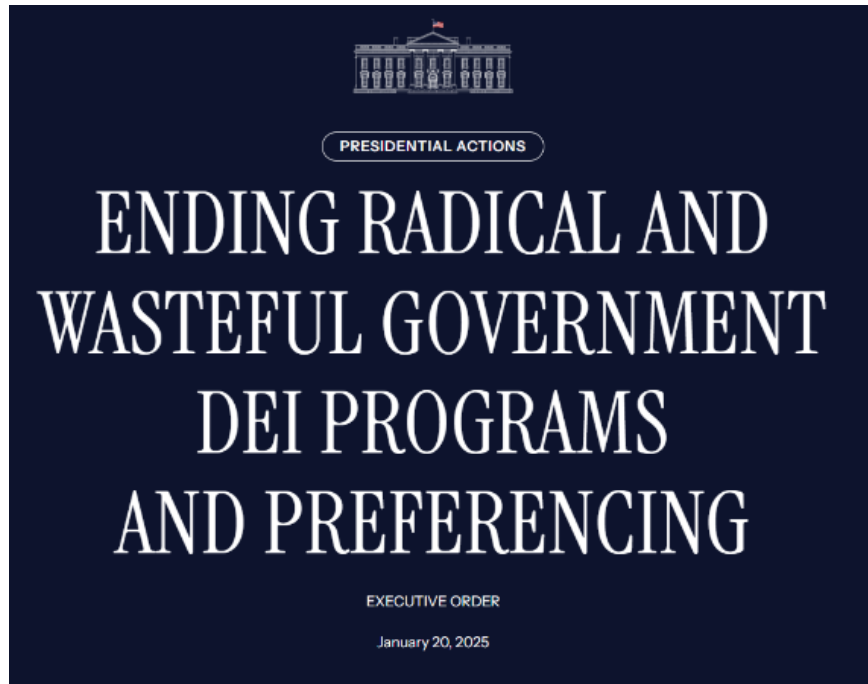
Notes. Guidelines 1-3 represent the principle of multiple means for representation, guidelines 4-6 represent the principle of multiple means for action and expression and guidelines 7-9 represent the principle for multiple means for engagement.

^aOnly faculty who designed some aspect of the online course were asked about using the UDL guidelines, and of the 107 individuals asked about their use of each guideline, responses were provided by 89 to 100 individuals, depending on the specific guideline.

^bPercentage denominator is the number of faculty who indicated use of the specific UDL guideline.

Appendix R

Executive Order by President of U.S.A to end DEI programs



By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered:

Section 1. Purpose and Policy. The Biden Administration forced illegal and immoral discrimination programs, going by the name “diversity, equity, and inclusion” (DEI), into virtually all aspects of the Federal Government, in areas ranging from airline safety to the military. This was a concerted effort stemming from President Biden’s first day in office, when he issued Executive Order 13985, “Advancing Racial Equity and Support for Underserved Communities Through the Federal Government.”

Pursuant to Executive Order 13985 and follow-on orders, nearly every Federal agency and entity submitted “Equity Action Plans” to detail the ways that they have furthered DEI infiltration of the Federal Government. The public release of these plans demonstrated immense public waste and shameful discrimination. That ends today. Americans deserve a government committed to serving every person with equal dignity and respect, and to expending precious taxpayer resources only on making America great.

Sec. 2. Implementation. (a) The Director of the Office of Management and Budget (OMB), assisted by the Attorney General and the Director of the Office of Personnel Management (OPM), shall coordinate the termination of all discriminatory programs, including illegal DEI and “diversity, equity, inclusion, and accessibility” (DEIA) mandates, policies, programs, preferences, and activities in the Federal Government, under whatever name they appear. To carry out this directive, the Director of OPM, with the assistance of the Attorney General as requested, shall review and revise, as appropriate, all existing Federal employment practices, union contracts, and training policies or programs to comply with this order. Federal employment practices, including Federal employee performance reviews, shall reward individual

initiative, skills, performance, and hard work and shall not under any circumstances consider DEI or DEIA factors, goals, policies, mandates, or requirements.

(b) Each agency, department, or commission head, in consultation with the Attorney General, the Director of OMB, and the Director of OPM, as appropriate, shall take the following actions within sixty days of this order:

(i) terminate, to the maximum extent allowed by law, all DEI, DEIA, and “environmental justice” offices and positions (including but not limited to “Chief Diversity Officer” positions); all “equity action plans,” “equity” actions, initiatives, or programs, “equity-related” grants or contracts; and all DEI or DEIA performance requirements for employees, contractors, or grantees.

(ii) provide the Director of the OMB with a list of all:

(A) agency or department DEI, DEIA, or “environmental justice” positions, committees, programs, services, activities, budgets, and expenditures in existence on November 4, 2024, and an assessment of whether these positions, committees, programs, services, activities, budgets, and expenditures have been misleadingly relabeled in an attempt to preserve their pre-November 4, 2024 function;

(B) Federal contractors who have provided DEI training or DEI training materials to agency or department employees; and

(C) Federal grantees who received Federal funding to provide or advance DEI, DEIA, or “environmental justice” programs, services, or activities since January 20, 2021.

(iii) direct the deputy agency or department head to:

(A) assess the operational impact (e.g., the number of new DEI hires) and cost of the prior administration’s DEI, DEIA, and “environmental justice” programs and policies; and

(B) recommend actions, such as Congressional notifications under 28 U.S.C. 530D, to align agency or department programs, activities, policies, regulations, guidance, employment practices, enforcement activities, contracts (including set-asides), grants, consent orders, and litigating positions with the policy of equal dignity and respect identified in section 1 of this order. The agency or department head and the Director of OMB shall jointly ensure that the deputy agency or department head has the authority and resources needed to carry out this directive.

(c) To inform and advise the President, so that he may formulate appropriate and effective civil-rights policies for the Executive Branch, the Assistant to the President for Domestic Policy shall convene a monthly meeting attended by the Director of OMB, the Director of OPM, and each deputy agency or department head to:

(i) hear reports on the prevalence and the economic and social costs of DEI, DEIA, and “environmental justice” in agency or department programs, activities, policies, regulations, guidance, employment practices, enforcement activities, contracts (including set-asides), grants, consent orders, and litigating positions;

(ii) discuss any barriers to measures to comply with this order; and

(iii) monitor and track agency and department progress and identify potential areas for additional Presidential or legislative action to advance the policy of equal dignity and respect.

Sec. 3. Severability. If any provision of this order, or the application of any provision to any person or circumstance, is held to be invalid, the remainder of this order and the application of its provisions to any other persons or circumstances shall not be affected.

Sec. 4. General Provisions. (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) the authority granted by law to an executive department or agency, or the head thereof; or

(ii) the functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

THE WHITE HOUSE,

January 20, 2025.

Appendix S

Using ChatGPT-4o to Improve Thesis

The following is the prompt used to generate a list of thesis-enhancing methods and the response given by ChatGPT-4o on December 4th, 2024.

Prompt

Hi, so if I want to make my focus group interview report particularly good and do something really outstanding, what are some ideas? It's a focus group interview report for a research study.

Response

To make your focus group interview report really stand out, consider these ideas:

Engaging Executive Summary: Start with a captivating executive summary that highlights key findings and insights. Use visuals like infographics to draw attention.

Thematic Analysis: Organize your findings around clear themes or narratives. This helps in presenting the data in a more digestible and compelling way.

Direct Quotes: Integrate impactful quotes from participants to give voice to your data. This adds authenticity and depth.

Visual Aids: Use charts, graphs, and other visual aids to illustrate key points. Visuals can make complex data more accessible.

Comparative Analysis: If relevant, compare your findings with existing literature or previous studies to highlight the significance of your results.

Narrative Style: Adopt a narrative style that guides the reader through the report as a story, making it more engaging.

Implications: Clearly outline the implications of your findings for practice, policy, or further research. This can demonstrate the value of your work.

Recommendations: Provide actionable recommendations based on your findings. This adds a practical dimension to your report.

Appendices:

You said:

"You can keep going. This adds a practical dimension."

00:03

ChatGPT said:

Sure, let's continue:

Appendices: Include detailed appendices with supplementary materials like interview guides, raw data, or coding frameworks for transparency and rigor.

Reflexivity: Reflect on your role as a researcher and how it might have influenced the data collection and interpretation. This adds depth to your analysis.

Innovative Presentation: Consider using digital formats or interactive elements if your report will be viewed online. This can engage your audience in a novel way.

Ethical Considerations: Highlight how you addressed ethical concerns, ensuring confidentiality and respect for participants. This builds trust in your research.

Limitations and Future Research: Acknowledge the limitations of your study and suggest areas for future research. This demonstrates a comprehensive understanding of your work's context.

You said:

"Thank you. What's your name?"

Appendix T

The following is the prompt used to explain ontological and epistemological stances and a prompt to find sources corroborating the findings. Multiple valuable sources were found and all of them were downloaded, read, and used in the thesis except one, Vygotsky (1978).

Prompt

define this please, simply ontological and epistemological stances.

Response

Simple Definitions:

- **Ontological stance** - What you believe about **reality**.
→ *Example*: Do you think reality is objective and exists independently of us, or is it shaped by human experiences and interpretations?
- **Epistemological stance** - What you believe about **knowledge** and how we can know things.
→ *Example*: Do you trust objective measurements and numbers (scientific method), or do you believe knowledge comes from personal experiences and perspectives?

In Research:

- A **positivist** researcher (objective reality, measurable facts) has a different **ontological and epistemological stance** than an **interpretivist** researcher (multiple realities, knowledge based on social context).

4o

You said:

what would a constructivity approach be called, and can you explain it

ChatGPT said:

A **constructivist approach** aligns with a **relativist ontology** and an **interpretivist epistemology**:

- **Ontology (What is reality?) - Relativist** → Reality is not fixed; it is socially constructed and varies based on individual or group experiences.
→ *Example*: The concept of "success" means different things in different cultures or social groups.
- **Epistemology (How do we know things?) - Interpretivist** → Knowledge is created through interactions, interpretations, and experiences rather than objective measurements.
→ *Example*: A researcher studying education might interview teachers and students to understand learning experiences rather than relying only on standardized test scores.

Constructivism in Research:

- **Focuses on meaning-making** - Researchers analyze how people interpret their experiences.
- **Uses qualitative methods** - Interviews, observations, and thematic analysis are common.
- **Acknowledges subjectivity** - Researchers recognize their own role in shaping interpretations.

This approach is common in **social sciences, education, and psychology**, where understanding human perspectives is key.

Prompt

give me a bibliography for this please

Response

ChatGPT said:

Here is a bibliography for the concepts discussed:

Bibliography

Creswell, J. W., & Poth, C. N. (2016). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th ed.). SAGE Publications.

Guba, E. G., & Lincoln, Y. S. (1994). "Competing Paradigms in Qualitative Research." In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 105-117). SAGE Publications.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. SAGE Publications.

Saldaña, J. (2021). *The Coding Manual for Qualitative Researchers* (4th ed.). SAGE Publications.

Schwandt, T. A. (1994). "Constructivist, Interpretivist Approaches to Human Inquiry." In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 118-137). SAGE Publications.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.

This bibliography includes foundational sources on constructivism, ontology, epistemology, and qualitative research coding.