



UNIVERSITY OF
CALGARY



Universal Design for Learning

in Program Development

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About the Guide

This guide is intended to be used by groups and individuals at the University of Calgary who are either developing a new program or examining an existing one. Although some of the ideas in this guide can be implemented within courses, many of them involve decisions that are at the department or faculty level. Others may be part of an institutional decision-making process. By reading about the examples provided, we hope you are inspired to implement principles of Universal Design for Learning (UDL) within your programs.

Working Definitions

The following terms can be understood in several ways. Throughout the guide, we use the following working definitions and examples.

Term	Working Definition	Example
Accommodation	Individual students are provided with an exemption to regulations, policies, standards or practices based on protected grounds, in order to mitigate barriers to learning (University of Calgary, 2015). “The process of adapting the way in which services are provided to eliminate or reduce the barriers that certain individuals experience when attempting to access those services” (Alberta Human Rights Commission, p. 3)	Textbooks and course materials in alternate formats, such as large print, audio format or Braille; photocopies or electronic copies of lecture notes; exam accommodations such as additional time (Alberta Human Rights Commission)
Accessibility	The learning environment is structured with a diverse group of learners in mind. Barriers are proactively anticipated and mitigated through learning design (Hitch et al., 2015; McMaster University, n.d.)	For a particular assignment, students are given a choice of format from within three options: paper, presentation or website

Equality	All students are treated equally	All students complete the same assignment
Inclusion	<p>The learning environment “embraces diversity and learner differences and promotes equal opportunities for all learners” (Government of Alberta, 2023)</p> <p>Inclusion “encompasses norms, practices, and intentional actions to promote participation, engagement, empowerment, and a sense of belonging for members of historically underrepresented and disadvantaged groups in all aspects of life. It is about promoting an institutional culture and practices to ensure all can experience a welcoming space of fairness, dignity, and human flourishing” (University of Calgary, 2023a)</p>	<p>The instructor plans activities that engage learners in different ways, to pique interest in different learners. For example, students might read a book chapter or participate in an online discussion</p>

The University of Calgary’s official definition of accommodation is outlined in the [Student Accommodation Policy](#) (2015). It includes a list of protected grounds as identified in the Alberta Human Rights Act.

Additionally, the Canadian Centre for Diversity and Inclusion website includes helpful definitions for terms: <https://ccdi.ca/glossary-of-terms/>.

Chapter 1: Introduction

What is Universal Design for Learning?

According to Novak and Bracken (2019), Universal Design for Learning (UDL) is

[a]n educational framework based on research in the learning sciences, that guides the design and development of inclusive educational systems that accommodate and challenge all students, and foster the development of innovative technologies and critical next generation skills. Internationally, higher education institutions have embraced the core principles of UDL to increase accessibility and engagement, increase retention and attainment, and improve the outcomes of all students (p. 4).

UDL, therefore, strives to make the learning experience as effective as possible for all learners. Regardless of the faculty or program, we can anticipate and plan for a diverse group of learners. In addition to social identity, diversity can refer to “philosophical or perspectival differences, institutional types, disciplinary fields, ways of knowing, theoretical and methodological variations” (University of Calgary, 2023a). Additionally, learners bring different lived experience to the classroom, and therefore different perspectives. UDL provides a framework that can help us to plan for and leverage learner diversity.

Indeed, diversity in the classroom can be beneficial to learners. In addition to learning about different perspectives, viewpoints and contexts, students can enhance their critical thinking skills by analyzing the assumptions they made from their own perspective. Alternative positions can also prompt them to consider ideas they had not thought of, broadening their viewpoint on issues. The UDL framework can be a catalyst to facilitating this process of incorporating diverse perspectives.

The [Canadian University Survey Consortium](#) (2022) publishes the results of a survey for first-year university students in Canada. Respondents to the most recent survey indicated differences in social identity, such as age and citizenship, as well as diversity across a number of other factors. About one-third of students reported having [neurodiversity](#), a disability, including mental health concerns, or learning/memory, vision and/or chronic conditions (CUSC, 2022). The University of Calgary releases an annual [Fact Book](#) that may also be helpful, with statistics on things such as learner demographics.

Inclusive programs and institutions are necessary to foster equitable learning opportunities for all students (Government of Alberta, 2023). Programs that strive for inclusion anticipate and respect learner differences, and actively work to remove barriers to learning.

Based on extensive scholarship about how the human brain learns, the CAST organization has created a framework for incorporating UDL in learning environments, activities and assessments. Within the framework they have identified

three UDL principles: multiple means of engagement, multiple means of representation, and multiple means of action and expression (CAST, 2022). These principles are salient to teaching and learning in higher education, providing a practical framework for those who wish to create inclusive learning environments.

In addition to being appropriate for all learners, it is important to note that implementing UDL does not mean that the expectations for student learning are lowered. Rather, the level of rigour for student learning is maintained regardless of the extent to which UDL is incorporated into a course or program. As stated in the definition, the goals of UDL include increasing accessibility and inclusion, student engagement and achievement of learning outcomes.

UDL involves anticipating barriers for students and proactively mitigating them while designing the learning environment. Barriers may include:

- Physical barriers, which may occur in the face-to-face classroom, such as stairs leading to the classroom or tiered seating in a lecture hall; lack of sight lines within a classroom or lack of an audio system in larger room
- Sensory barriers in the learning environment that provide additional sensory information that impacts attention, such as loud noises and bright lights
- Technology barriers, including internet access or accessing specific sites for students who are at a distance
- Financial barriers that prevent students from accessing aspects of a course, such as subscriptions to an e-text and/or associated online quizzes given by the publisher
- Cognitive barriers and other barriers to learning, including those experienced by **neurodiverse** learners. Cognitive barriers can include the speed, format and structure that information is provided in.

It is important to note that some strategies will increase accessibility for some students yet create barriers for others. For example, using a learning management system to administer quizzes online can allow students to take the quiz at the time of day that is optimal for them. However, the online quiz could cause problems for students with unreliable internet access. When implementing a teaching and learning strategy that might impede accessibility for some students, consider using a “multiple means” approach (CAST, 2023). By offering learners multiple means, or ways, of comprehending learning and expressing their understanding of it, you may be able to mitigate accessibility issues.

Multiple Means of Engagement

The first UDL principle is multiple means of engagement. The theory behind this principle is that learners have different levels of comfort and motivation in various learning environments (CAST, 2023). Providing learners with different learning materials may encourage them to broaden their comfort levels and willingness to

engage in learning. Additionally, using various approaches will mitigate the challenges that some students will have with a single learning approach that does not motivate or engage them.

When designing or renewing programs, multiple means of engagement can be used in many different ways, such as incorporating **experiential learning** into a program, and carefully selecting learning technologies that enhance student learning. For ideas on incorporating multiple means of engagement at the course level, refer to Appendix 1.

Multiple Means of Representation

The second UDL principle, multiple means of representation, is meant to provide different ways for learners to comprehend information and new learning (CAST, 2023). Rather than relying solely on one way of representing learning, using multiple means of representation can stretch learners to develop skills in understanding information across formats, such as text, video and other media, charts and graphs, and different pedagogical approaches. Additionally, representing information in multiple ways makes the content more accessible and inclusive.

Multiple means of representation can also be considered when designing or modifying a curriculum. Your faculty or department might implement a guideline that encourages everyone to use open education resources, where that option exists, or to purchase digital texts for the library to make them accessible for students. Suggestions for incorporating multiple means of representation at the course level can be found in Appendix 1.

Multiple Means of Action and Expression

The third UDL principle, multiple means of action and expression, highlights the benefits to students of demonstrating their learning in different ways, such as on exams, and through assignments, discussion and authentic learning tasks (CAST, 2023). Learners are therefore prompted to organize information, make connections and demonstrate their understanding in multiple ways. Much of the time in higher education, multiple means of action and expression is associated with student assessment.

There are various ways in which multiple means of action and expression can be incorporated when designing or renewing a program. For example, programs with **work-integrated learning** or **undergraduate research** may implement **authentic assessments**. For more information on authentic assessment, refer to the article, “Authentic assessment: Creating a blueprint for course design” (Villarroel et al., 2018). Faculty and/or departmental policies around student assessment have the potential to lessen or to increase student anxiety. For suggestions on incorporating multiple means of action and expression into courses, refer to Appendix 1.

Chapter 2: Ministry Expectations for UDL in Alberta

Curriculum Review and Development

Campus Alberta Quality Council provides recommendations to the Ministry of Advanced Education on new program proposals for degree programs in Alberta. In their handbook, *Quality Assessment and Quality Assurance*, Campus Alberta Quality Council (2022) has identified accessibility as a priority for post-secondary degrees in Alberta. As part of the curriculum review process, institutions are to conduct a self-study that covers a number of considerations, including curriculum evaluation. One of the standards that is expected for blended, distributed or distance delivery modes relates to accessibility:

Given that learners have diverse learning needs, the institution should assure that the diverse needs of learners are appropriately addressed, and when necessary, accommodated (p. 98).

The Campus Alberta Quality Council (2022) also emphasizes accessibility in degree programs, including the following:

- Library services are accessible to students.
- IT services are accessible to students (p. 57).
- Policies on things such as admission requirements and transfer credits, as well as student supports and services, are readily available to students (p. 195).

Therefore, it is critical to consider issues relating to inclusive programs and accessible services when designing or renewing a program of study. The UDL framework can provide some guidance.

Principles of Inclusive Education

Inclusive education is an important part of UDL. The Government of Alberta (2023) has issued a set of principles for inclusive education to help “guide and inform value-based and learner-centred decisions related to policies, practices and actions at every level of Alberta’s education system”:

- Anticipate, value and support diversity and learner differences.
- Maintain high expectations for all learners.
- Understand learners’ strengths and needs.
- Remove barriers within learning environments.
- Build capacity at the individual, school and system levels for relationships and resources that create flexible and responsive learning environments.
- Collaborate for success.

Chapter 3: Faculty and Department Approaches to Incorporate UDL into Programs

Guidance for incorporating UDL into courses and programs can come from various sources in the institution, including centres for teaching and learning, faculties, mentors and peers, administration, accessibility services and student services. Although many recommendations for incorporating UDL are relevant to individual courses, there is a great deal that can be done at the program level as well. In this section we outline some considerations for faculties and departments that have the potential to make programs more accessible, inclusive, engaging and relevant for students.

Note that some of these strategies are relevant both at the program level and the institutional level. They will not be repeated in both sections.

Course Outline Templates

Inclusive course outlines offer a number of benefits, such as contributing to a positive learning environment and clarifying expectations for learners, as well as signalling to students that they belong in the course and the program. An inclusive course outline template will have an academic accessibility statement, including information on what students should do if they require an accommodation. These can change from time to time, so ensure they are up to date. For more information, contact **Student Accessibility Services**. You may also want to consult with the **Student Success Centre** and **Student Wellness Services** to ensure that standard statements on the course outline are current.

As part of the faculty or department course outline template, add a section on **technology requirements**. Ask instructors to articulate any software requirements, including whether or not the learning management system will be used in the course. This will help to mitigate any technology barriers.

Include a section where instructors convey the course outcomes so that they articulate their learning expectations to students. Also add how students will be assessed on these learning outcomes, including essential information such as due dates.

Advise instructors to request reading lists early (if possible) to allow time for **Student Accessibility Services** to prepare accessible versions of textbooks and articles (King's Western University, n.d.). Also, add a statement on **academic integrity** to the course outline template.

Along with the course outline template, include guidance on how to increase accessibility of the document. For example, **this resource** offers suggestions to make

Word documents more accessible for people who use screen readers or magnifiers, and those who read documents on devices such as tablets and phones.

Professional Learning and Development on UDL

A faculty or department can provide professional learning and development for academic staff and others who are in a teaching role in order to increase their understanding of UDL and inspire strategies for implementing it within their courses. It can be particularly salient for course coordinators and others who support instructors, especially those who teach large-enrollment courses. Note that some of these learning opportunities may be available at the institutional level. Some options follow.

Workshops: Topics might include a general introduction to UDL, inclusive teaching practices, teaching students from a low socio-economic background, teaching Indigenous students, culturally sustaining teaching practices, anti-racist and decolonizing pedagogy, cultural competency training, inclusive learning spaces or inclusive practices in online environments (Hitch et al., 2015). The [Taylor Institute for Teaching and Learning](#) offers a variety of workshops and programs. [Refer to the calendar](#) for current offerings.

Communities of Practice (CoPs): A CoP is a group of people who meet on a regular basis to discuss a particular topic, with the intention of improving everyone's understanding of it. Specific areas of interest emerge from the group and the CoP often follows a shared leadership model. CoPs can allow participants to make connections with other instructors and brainstorm for ideas to address specific challenges (Xie & Rice, 2021).

Teaching Squares: [Teaching Squares](#) are small groups of instructors who take turns observing each other's teaching in order to learn from them and reflect on their own teaching, with the goal of improving their teaching practice.

Mentoring Programs: [Mentoring](#) can be a valuable way for academic staff to learn from others. By setting goals, a mentee can generate a flexible and personalized plan for their learning about UDL (Galipeau et al., 2018). Mentoring does not have to be a one-to-one relationship; mentors might mentor a small group that is interested in the same topic. For example, one academic staff member might mentor a small group of graduate students who are interested in creating student assessments within a course.

Curriculum Review and Development

The purpose of a curriculum review is to evaluate the effectiveness of a program and continue to enhance student learning opportunities. Many different aspects of a program can be investigated. The specific focus of a curriculum review depends on whether accreditation requirements must be met, ministry needs relating to quality

assurance, and guidelines of the institution. Typically, groups conducting the review have some flexibility to incorporate their own questions and interests as well, which allows leeway to investigate how UDL is integrated into the program. Groups that are designing a new program can consider aspects such as accessibility and inclusive practices from the outset. Guiding questions such as the following could be used to frame the curriculum review or evaluate a new program that is being developed:

- How are we incorporating inclusive teaching and learning practices into our program design (Hitch et al., 2015)?
- How accessible are our courses and services?
- What barriers exist for students to be admitted to the program, register in our courses and progress through the program (Pichette et al., 2020)?
- To what extent have we created a curriculum that meets students' needs while allowing them to make reasonable progress?
- How are we scaffolding knowledge and skills across the program of study?
- How are we mitigating barriers to progress, such as ensuring that prerequisite courses are available and essential to further learning?
- How does the program incorporate anti-racist, decolonizing and inclusive practices into the curriculum?
- How do we recognize and understand systemic inequities within our field and our current program?

Unit Plans and Other Planning Documents

Faculties and departments can consider adding elements of UDL into their unit plans and other planning documents. For example, part of the plan could be to identify priorities relating to inclusive learning and universal design that you can work on over the short, medium and long term. An example can be found below.

Action Item	Timeline	Responsibility	Evaluation
Identify student barriers to registering in required courses	Create and administer a student survey - 6 months Analyze the data and write a brief report - 9 months	Office of the Dean	Was the survey administered? Were the data analyzed to identify barriers? Were the barriers addressed?

Offer a workshop on inclusive pedagogy	First offering in 6 months	Associate Dean of Teaching and Learning to appoint a facilitator	Number of attendees Workshop evaluation form feedback
Complete a scan of existing student services and campus resources that support diverse student populations	6 months	Office of the Dean	Resource list created for instructors, students and staff

Teaching Awards

If your faculty or department has a teaching awards program, consider offering an award for accessible teaching and learning practices. The Award for Inclusive Excellence category of [UCalgary’s Teaching Awards](#) is one example. It can be awarded to individuals, teams or units to acknowledge contributions toward equity, diversity, inclusion and accessibility in our teaching and learning environment. Such awards can highlight good practices that provide a positive example for others (Hitch et al., 2015). This site includes more information about [UCalgary’s Teaching Awards](#) program, with a link to the terms of reference for the awards.

Funding for Inclusive and Accessible Courses

A faculty or department could provide project funding or research grants, for example, for a number of different purposes relating to UDL, including:

- to create inclusive courses or learning materials, including collaborative projects and those involving graduate teaching assistants. Such projects can promote capacity-building while strengthening teaching and learning practices
- to investigate an aspect of UDL within a course
- to hire a teaching assistant who can concentrate on accessibility while a course is underway (Hitch et al., 2015)
- to create [open education resources](#) for a required course in the program
- to create a [students as partners](#) (SaP) initiative. SaP can have a positive impact on the integration of UDL in courses in different ways. Students could co-design a course, providing input on learning activities to engage students, for example. The instructor might also create a student advisory panel in large classes (Healey, 2023).

Learning Spaces

Faculties may or may not have much input regarding learning spaces. If you are involved in the decision-making around classroom design or furniture purchases, consider the following. Note that many considerations are important for instructors and staff as well as students.

- Consider accessibility and inclusion when purchasing classroom supplies, as well as equipment and furniture for offices and learning spaces. Students who require assistive technologies often require a larger desk surface than currently exists in lecture halls with fold-away desktops, in order to place their laptop. Instead, consider individual desks or table groupings for four to six students to work collaboratively (Lintangsari & Emaliana, 2020).
- Tables and chairs that are fixed to the floor tend to be less flexible, making it more difficult to accommodate students with mobility problems (Valle-Flórez et al., 2021). Rooms with stairs such as tiered lecture halls provide additional physical barriers.
- When you are renovating offices and learning spaces, consult with a steering committee with wide representation across faculty, students and staff, to ensure you have diverse perspectives on inclusive practices.
- Equip rooms with scanners and other necessary technologies (Valle-Flórez et al., 2021). A microphone or sound system can be critical for larger classrooms in order for all students to hear the instructor.
- Highlight accessible and all-gender washrooms near teaching spaces, as well as flexible space for standing during learning interactions (Ross, 2023, personal communication).
- Consider flexible lighting that is adaptable for a variety of sensory experiences.
- Consider a low sensory room for students who require it for concentration.

Textbooks and Learning Materials

- Consider a faculty policy on selecting textbooks and other learning materials that are offered in an accessible format where available, such as e-books that can be read by a screen reader.
- Provide information to instructors on [open educational resources](#), such as how to locate them for their courses.
- Purchase a copy of required texts for the digital library. Courses with hundreds of students will require multiple copies of the texts to ensure availability.
- For courses that require specialized software, consider purchasing some licences for on-campus computers. This strategy will be ineffective if you have students learning from a distance.

Handout for Students

Create a short handout for students that is available online as well as in the faculty or department office. Include information such as how to access [Student Accessibility Services](#), the [Student Success Centre](#) and [Student Wellness Services](#), locations for low-sensory rooms on campus, advising information, and faculty and department-specific supports and services such as mentoring programs.

Faculty or Department Website

Ensure that the faculty and/or department website complies with current accessibility standards. Conduct an accessibility audit to ensure that the site is accessible to those who use screen readers or have visual or audio impairment.

Peer Mentoring

Provide funding for student peer mentoring programs. You may want to refer to information on the [Faculty of Arts peer mentoring program](#), or the one offered by the [Cumming School of Medicine](#). Consult with [Student and Enrolment Services](#) for suggestions on customizing mentoring programs.

Representation on committees

Where relevant, appoint or include a committee member who will bring an inclusivity lens to tasks. For example, faculty teaching and learning committees and hiring committees might benefit from this approach.

Recommendations on Assessment Practices

Strike a committee to review assessment practices within the program and make recommendations to instructors. The committee could be part of a curriculum review process, a faculty teaching and learning sub-committee or a special task force. Examine assessment practices through a UDL lens to gauge inclusivity and accessibility and identify any excessively punitive practices.

Chapter 4: Institutional Approaches

Many of the strategies listed for faculties and departments also apply at the institutional level. For example, teaching awards and grants, professional learning and development programs, considerations for learning spaces, and considerations for software licensing are all applicable at the institutional level. This section provides additional detail about institutional strategy documents and the selection of learning technologies.

Institutional Strategy Documents

Some institutions incorporate elements of UDL into their strategic plans or policy documents, which demonstrates the value placed on accessibility, diversity and inclusion. Examples are included below.

- UCalgary's 2023–2030 strategic plan, *Ahead of Tomorrow*, expresses a commitment to education that is equitable and inclusive to all (University of Calgary, 2023b).
- McGill University had an objective to expand social, economic and intellectual diversity in their *academic plan* (2017). They also had targets to expand accessibility to programs in relation to financial assistance, enhancing physical accessibility and expanding cultural diversity, which will allow them to measure their progress over time.
- Concordia University's (2022) *policy on accessibility and accommodation for students and employees* includes a commitment to the principles of UDL.
- Mohawk College has developed a *UDL Standard* that outlines considerations for course design, development and delivery. UDL is also an integral part of their *Equity, Diversity and Inclusion (EDI) Action Plan*.

Learning Technologies Selection and Features

- Another way in which institutions incorporate principles of UDL is during their evaluation of learning technology purchases and licence renewals. The Ontario Council of University Libraries (n.d.) has outlined a list of *criteria for evaluating hardware and software* in the context of accessibility.
- Many instructors examine their courses to ensure that course materials are accessible. This includes gauging learning technologies with criteria such as accessibility, functionality across various platforms and ease of use (Anstey & Watson, 2018).
- Evaluate possible learning technologies from a variety of perspectives, not just instructors'. Get feedback from people who use screen readers and magnifiers, and those who are remote or rural, and test new tools on devices such as tablets and cell phones. Gather feedback on things such as ease of use, customization for individual users and compatibility with other tools (Ontario Council of University Libraries, n.d.).

- Learning management systems such as Moodle (2022) and Brightspace (D2L Corporation, 2022) have checkers to ensure that web content meets accessibility standards, and other tools such as Microsoft Word and PowerPoint have accessibility checkers instructors can use on course materials (Microsoft, 2022).
- The University of Calgary considered several criteria relating to UDL when renewing the licence for their learning management system, including features such as incorporating different types of student content on discussion boards (video, audio, text), individualized access to timed assessments, and fostering student choice through self-enrollment in discussion boards.

Chapter 5: Discussion Questions for Examining how UDL is Incorporated at the Program Level

The following list provides examples of questions that might be addressed by groups when thinking about incorporating UDL at a program level:

General Questions

How do we anticipate, value and support diversity and learner differences across the program (Government of Alberta, 2023)?

- How are we taking student **neurodiversity** into account when designing programs and courses?
- How does the curriculum support students' development of skills in managing and connecting new information?
- How do we foster wellness for all students throughout the program?
- How does the program acknowledge and allow students to draw on their lived experience outside the classroom?

How can we create flexible and responsive **learning environments** that support a range of student needs (Government of Alberta, 2023)?

- How much choice is available in degree pathways and course selection?
- What consideration is there for UDL at faculty and department committees?
- What incentives and **supports** do we have for instructors to incorporate UDL in their courses?
- How do we ensure that learning experiences are accessible to as many students as possible?
- What learning technologies could we use to engage students in authentic learning?
- How do we incorporate variety in teaching and learning approaches across the program, such as experiential learning, work-integrated learning, Indigenous approaches to teaching, field trips, entrepreneurial thinking or undergraduate research?

What have we heard from students about barriers to their learning and how might we address them (Government of Alberta, 2023)?

- How do we understand and address systemic inequities within our field and within our current program, including the impact they have on academic integrity?
- How do we ensure that learning experiences such as work-integrated learning are accessible to as many students as possible?

How do we promote and assess deep learning across the program?

- What opportunities exist for students to connect their learning to community or professional practices?
- What opportunities are available for students to reflect on their learning? How does the program support the development of a growth mindset?
- What opportunities are available for students to reflect on their learning? How does the program support the development of a growth mindset?
- How do we promote authentic learning throughout the program and its design?
- How do we help students to develop an understanding of feedback and strategies for self-monitoring through the program?

Chapter 6: Annotated Bibliography

Basham, J. D., Gardner, J. E., & Smith, S. J. (2020). Measuring the implementation of UDL in classrooms and schools: Initial field test results. *Remedial and Special Education, 41*(4), 231-243. <https://doi.org/10.1177/0741932520908015>

Basham et al. (2020) spoke to the challenges institutions face when evaluating the implementation of UDL. This was especially pertinent since many higher education institutions within the United States have recently designed policies focused on UDL implementation after encouragement by the federal government. To mitigate the challenges these institutions are facing due to these newly created policies, the authors created and evaluated a tool, the UDL-Observation Measurement Tool (OMT), which would serve to observe and measure UDL implementation in these environments. The tool's criteria aligned with CAST UDL guidelines and asked educators to first observe how material was introduced, framed and delivered, and then to analyze student understanding and engagement. The results of the study demonstrated that this tool was reliable and effective, and could be used for both whole-class and individualized implementation to assess UDL implementation.

Bracken, S. & Novak, K. (2019). *Transforming higher education through Universal Design for learning: An international perspective*. Routledge.

Bracken and Novak (2019) reviewed and shared strategies for successful UDL implementation, citing institutional adoption of UDL as a key factor to this success. More specifically, the authors encouraged the application of UDL principles to curriculum and other existing policies within the institution. The authors also emphasized that UDL implementation benefits are not limited to students with disabilities; UDL can benefit all students within the institution. Finally, the authors encouraged administrative support of educators through both professional development opportunities and the creation of professional learning communities.

Burgstahler, S. E. (2020). *Creating Inclusive Learning Opportunities in Higher Education: A Universal Design Toolkit*. Harvard Education Press.

Burgstahler (2020) reviewed and discussed the history, background, availability and challenges surrounding accessibility services and programs for students with disabilities in higher education. She also focused on the value of prioritizing the inclusion of and use of technology that is accessible to learners within higher education classrooms. The author suggested that universal design (UD) should be an important consideration for institutional leaders at higher education institutions and offered specific and pertinent recommendations related to the implementation and adoption of UD from a leadership perspective, such as ensuring services, resources and spaces within the institution have considered UD and are accessible for all students. Most relevant, however, was Burgstahler's (2020) suggestion to encourage all programs and departments to incorporate UDL principles within all curricular content and to ensure their curriculum highlights a reflective and inclusive design process.

Childs, E., & Axe, J. (2020). Snapshot—Designing for open educational environments: Balancing access, equity, and engagement. *In Universal Access through Inclusive Instructional Design*, 315–317. Routledge.
<https://doi.org/10.4324/9780429435515-41>

Childs and Axe (2020) described an open, personalized and more flexible educational program recently developed and piloted at a western Canadian university. In fact, this program was initially redesigned after ensuring consideration of UDL principles right at the start of program design. More specifically, the program promoted inclusion and supported access for all students. The authors spoke to the benefits and challenges that were encountered due to this approach. In addition, they emphasized that continuous research regarding open educational environments versus closed learning management systems should be undertaken to identify key considerations for all stakeholders.

Edyburn, D.L. (2010). Would you recognize Universal Design for Learning if you saw it? Ten propositions for new directions for the second decade of UDL. *Learning Disability Quarterly*, 33(1), 33–41. <https://doi.org/10.1177/073194871003300103>

Edyburn (2010) encouraged policy makers, administrators and other stakeholders in higher education settings to initiate and continue conversations about UDL principles and practices. The author offered many recommendations for UDL implementation, including the suggestion that the role of an educator could be redesigned as it relates to creating curriculum with UDL in mind. As an alternative, the author suggested that instructional designers could create universally designed products that could then be used and adapted by educators. The author also recommended that more research be undertaken, especially in defining and measuring UDL implementation. Finally, the author proposed that all key stakeholders receive training on UDL principles.

Edyburn, D. (2011). Harnessing the potential of technology to support the academic success of diverse students. *New Directions for Higher Education*, 154, 37–44.

In this chapter, Edyburn (2011) empathized with administrators within higher education institutions, as increasing inclusive practices and supporting a diverse student body are complex processes. To mitigate these challenges, the author emphasized the importance of using technologies to apply UDL principles that support the success of students with disabilities, as well as to enhance educational outcomes for all students. Edyburn (2011) spoke directly to administrators, asking them to consider top-down strategies specifically related to assistive technology and campus services. In addition, Edyburn (2011) offered suggestions to empower bottom-up change by asking administrators to provide educators with resources and opportunities for professional development in UDL, which in turn would enhance the experience of their diverse students. Finally, the author encouraged administrators to be optimistic about policy changes, especially regarding the use of and alignment of technology campus-wide.

Fovet, F. (2021). Developing an ecological approach to the strategic implementation of UDL in higher education. *Journal of Education and Learning*, 10(4), 27–39. <http://dx.doi.org/10.5539/jel.v10n4p27>

Fovet (2021) looked closely at UDL implementation across Canadian higher education institutions, noting that it is critical for administrators within these organizations to address the institutional challenges that come with UDL implementation. To mitigate these challenges, Fovet (2021) proposed the creation of strategic and easily implemented models to support UDL implementation campus-wide, and also asked administrators to seek and use a model that supports their organization's unique needs. Next, the author recommended engaging all institutional stakeholders to take initiative during this complex implementation process, which in turn, could potentially mitigate resistance by these same stakeholders.

Fovet, F., Mole, H., Jarrett, T., & Syncox, D. (2014). Like fire to water: Building bridging collaborations between disability service providers and course instructors to create user friendly and resource efficient UDL implementation material. *Collected Essays on Learning and Teaching*, 7(1), 68. <https://doi.org/10.22329/celt.v7i1.3999>

Fovet et al. (2014) analyzed the factors that appeared to help or impede the UDL implementation process in higher education institutions. The authors concluded that for successful implementation of the UDL framework, administrators and educators must collaborate, share expertise and support each other to improve accessibility. In addition, the authors outlined specific strategies administrators and stakeholders could try during their own UDL implementation process, including selecting designated UD leads within each program who could share and model UDL principles, creating a bank of UDL video resources that could be easily accessed and viewed by educators, outlining UDL proficiency as a criterion for tenure and, finally, providing a support service for curriculum redesign specifically for integration of UDL principles.

Hills, 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), 1–18. <https://doi.org/10.5206/cjsotlr.cacea.2022.1.13588>

This article spoke to the perceptions and understandings of faculty regarding the implementation of UDL. Hills et al. (2022) revealed that institutional support for faculty in the implementation of UDL is essential, especially in a post COVID-19 world, as the pandemic has magnified the need for accessibility and emphasized the importance of inclusion. The authors studied faculty members at a Canadian undergraduate university and found that they have faced challenges in both understanding and implementing UDL within their classrooms. In addition, time and resource constraints also impacted the faculty members' ability to implement UDL within their classrooms. Hills et al. (2022) supported combining both top-down and bottom-up approaches, such as creating formalized policies and empowering informal conversations about UDL

success and practice. Ultimately, the study concluded there is a need for UDL to become integrated into the culture of the institution itself.

Hitch, D., Macfarlane, S., & Nihill, C. (2015). Inclusive pedagogy in Australian universities: A review of current policies and professional development activities. *The International Journal of the First Year in Higher Education*, 6(1), 135–145. <https://doi.org/10.5204/intjfyhe.v6i1.254>

Hitch et al. (2015) analyzed higher education institutions in Australia, searching for policies and institutional supports related to UDL and inclusive teaching. The authors found that these policies were not widely available, nor were solid professional development opportunities available for educators within these institutions. The authors emphasized that to establish inclusive classrooms and teaching practices, institutions must support UDL implementation and provide training for it. In fact, Hitch et al. (2015) suggested that institutions should create a specific policy for UDL implementation and support it with opportunities for professional development in UDL and inclusivity. Finally, the authors encouraged the creation of and support for a culture that supports the implementation and practice of UDL.

Hollingshead, A., Lowrey, K. A., & Howery, K. (2022). Universal Design for Learning: When policy changes before evidence. *Educational Policy*, 36(5), 1135–1161. <https://doi.org/10.1177/0895904820951120>

Hollingshead et al. (2022) spoke to the importance of considering the UDL framework during the curriculum design process, but implied that the lack of a unified definition of UDL, along with the complexities of implementing a UDL framework, could cause this to be challenging. This is further exemplified by the data the authors shared. In fact, the authors posited that although educational policy with the United States today encourages the consideration of UDL when designing curriculum, it is not clear what this would entail in practice. They concluded that there is a need for critical research to provide clarity about how UDL can be used in curriculum design, and that the uncertainty about what UDL is or should be in practice impacts how educators understand and implement UDL.

Hromalik, C. D., Myhill, W. N., Ohrazda, C. A., Carr, N. R., & Zumbuhl, S. A. (2021). Increasing Universal Design for learning knowledge and application at a community college: The Universal Design for Learning Academy. *International Journal of Inclusive Education*, 1–16. <https://doi.org/10.1080/13603116.2021.1931719>

Hromalik et al. (2021) acknowledged the use of the UDL framework by educators within higher education learning environments but also emphasized the lack of professional development training programs for these same educators. To further highlight the importance of these opportunities for educators, the authors followed faculty attending the “UDL Academy,” a training session designed to supporting Onondaga Community College faculty members in educating diverse learners. This multi-day UDL training led to faculty being considerably more knowledgeable about UDL, and more prepared to implement UDL on campus, therefore offering compelling evidence that

higher education institutions should take responsibility for training their educators about UDL and its implementation.

Lintangsari, A. P., & Emaliana, I. (2020). Inclusive education services for the blind: Values, roles, and challenges of university EFL teachers. *International Journal of Evaluation and Research in Education*, 9(2), 439–447.

<https://doi.org/10.11591/ijere.v9i2.20436>

Lintangsari and Emaliana (2020) described many of the challenges higher education institutions face when trying to implement inclusive education and highlighted the vital role of higher education institution administrators in this process. The authors studied an English as first language (EFL) educator within a higher education institution in Indonesia as she worked with a student who was blind. The educator faced multiple challenges while working with the student; most significantly, infrastructure challenges. More specifically, the educator had no access to assistive technology, which was essential to the student's success. The authors emphasized that higher education institutions are responsible for designing policies that support inclusive practices and must provide needed resources to educators to ensure they are equipped to create and sustain inclusive learning spaces. In addition, the authors asked administrators to design required training courses about inclusive education practices for instructors.

McKenzie, J. A. & Dalton, E. M. (2020). Universal design for learning in inclusive education policy in South Africa. *African Journal of Disability*, 9, 776–778.

<https://doi.org/10.4102/ajod.v9i0.776>

McKenzie and Dalton (2020) studied educational policies related to inclusion and UDL throughout various institutions in South Africa. They shared many challenges related to the implementation of UDL, highlighted the doubts and uncertainties expressed by educators, and revealed the desire of educators to participate in UDL professional development. The authors suggested that these uncertainties and challenges could be mitigated by increased administrative support, starting with the creation of inclusive educational policy and strategic planning. In addition, the authors encouraged these administrators to recognize the value in providing both professional development training and institutional support for educators to ensure successful UDL implementation. Additionally, the authors recommended that administrators set institutional goals to integrate UDL, rather than solely supporting educators and classrooms on a case-by-case basis.

Moore, E. (2019). From teaching content to teaching students: UDL as a vehicle for improving curriculum and praxis design. *In Transforming Higher Education Through Universal Design for Learning*, 228–243. Routledge.

<https://doi.org/10.4324/9781351132077-14>

Moore (2019) suggested that the quality of higher education worldwide needs improvement and offered UDL implementation as an essential framework that could promote student growth and shift the institutional focus to a more student-centered one. The author suggested that successful implementation initiatives and systemic change can be complex within higher education

institutions, and therefore asked administrators within these institutions to reimagine the role of educators. The author emphasized that educators have the ability not only to champion change in their own classrooms, but to affect change within the policy and systems of these institutions as well.

Scott, L. A., Thoma, C. A., Puglia, L., Temple, P., & D’Aguilar, A. (2017). Implementing a UDL framework: A study of current personnel preparation practices. *Intellectual and Developmental Disabilities, 55*(1), 25–36.

Scott et al. (2017) noted that students with intellectual disabilities face many challenges, especially in higher education institutions. Throughout the study, the authors looked closely at the preparedness of coordinators within these environments in supporting these students, particularly when implementing a UDL framework. The results of their study indicated it is critical for stakeholders, especially educators, to have access to training and professional development before and during the implementation of a UDL framework.

Smith, S. J., Rao, K., Lowrey, K. A., Gardner, J. E., Moore, E., Coy, K., Marino, M., & Wojcik, B. (2019). Recommendations for a national research agenda in UDL: Outcomes from the UDL-IRN Preconference on Research. *Journal of Disability Policy Studies, 30*(3), 174–185. <https://doi.org/10.1177/1044207319826219>

Smith et al. (2019) recognized that there is increased desire to include UDL in higher education policy. However, they also identified challenges in defining UDL and when implementing UDL across both K-12 and higher education environments. The authors concluded that more research and study is required, especially regarding how to implement UDL in a way that supports the design of inclusive learning spaces to meet the needs of all learners. Based on these data, the authors provided four recommendations for the awareness and implementation of UDL:

1. Instructors and researchers could be provided with specific UDL criteria aligned with student outcomes, thereby encouraging administrators and stakeholders to consider and include these principles.
2. The authors highlighted the necessity of reliable and consistent measures while evaluating the implementation of UDL.
3. UDL training for educators should be focused on both awareness and implementation of UDL.
4. Providing and integrating technology to support UDL initiatives is critical.

Smith, S. J., & Lowrey, K. A. (2017). Applying the Universal Design for Learning framework for individuals with intellectual disability: The future must be now. *Intellectual and Developmental Disabilities, 55*(1), 48–51.

Smith and Lowrey (2017) reviewed and summarized current research surrounding UDL and students with intellectual disabilities (ID). They emphasized the importance of examining UDL as a tool for creating inclusive environments, and noted that this is especially important for students with ID who face many challenges before and while attending post-secondary

institutions. The authors suggested that the CAST UDL framework could serve as the foundation of program design and could be considered even before the curriculum's initial development. Finally, Smith and Lowrey (2017) proposed emphasizing and including resources and education pertaining to UDL practices during pre-service training programs and professional development sessions for practicing teachers.

Valle-Flórez, R., de Caso Fuertes, A. M., Baelo, R., & García-Martín, S. (2021). Faculty of Education professors' perception about the inclusion of university students with disabilities. *International Journal of Environmental Research and Public Health*, 18(21), 11667. <https://doi.org/10.3390/ijerph182111667>

Valle-Flórez et al. (2021) recognized there has been some progress in the creation of policies that support students with disabilities and their right to equal opportunities. However, the authors also noted that although higher education institutions around the globe have prioritized inclusion, this is not the case in practice. In fact, the authors discovered that many educators perceive there to be challenges related to UDL implementation, including a lack of infrastructure and limited training on how to use available resources and equipment. In addition, many educators were unaware of UDL principles and therefore not comfortable with UDL implementation. To mitigate this, the authors emphasized the value of improving professional development and training, which are critical in supporting educators in implementing UDL and creating inclusive spaces.

Westine, C. D., Oyarzun, B., Ahlgrim-Delzell, L., Casto, A., Okraski, C., Park, G., Person, J., & Steele, L. (2019). Familiarity, current use, and interest in Universal Design for Learning among online university instructors. *International Review of Research in Open and Distributed Learning*, 20(5), 20–41. <https://doi.org/10.19173/irrodl.v20i5.4258>

In this study, Westine et al. (2019) examined the perceptions of faculty surrounding the use of UDL within online course design and implementation. The authors studied online educators at a large post-secondary institution in the United States and found that many faculty members expressed interest in learning more about the UDL framework. In fact, many faculty members were not familiar with UDL principles or their application. However, even faculty who were aware of UDL guidelines indicated a desire to learn more about it as it relates to their teaching. The study's findings indicated that post-secondary institutions and relevant stakeholders should prioritize the creation of professional development training in UDL for online faculty, and even empower online educators within the faculty who have received training or have had experience with UDL in their online teaching to share and disseminate this information to other faculty members.

Xie, J., & Rice, M. F. (2021). Professional and social investment in Universal Design for Learning in higher education: Insights from a faculty development programme. *Journal of Further and Higher Education*, 45(7), 886–900. <https://doi.org/10.1080/0309877X.2020.1827372>

Xie and Rice (2021) interviewed five higher education instructors from diverse backgrounds after they participated in workshops about UDL. Their findings indicated that it was extremely valuable for educators within higher education institutions to participate in professional development and training about UDL, as it prepared them to carry these learnings into their classrooms. At times it also empowered them to support fellow instructors, thereby building community. The authors offered valuable tips for administrators regarding what to include within these trainings, and encouraged administration to place high value and invest in these professional learning practices to encourage and support educators in UDL by providing ample time, resources and space.

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<https://doi.org/10.1080/0309877X.2020.1827372>

Appendix 1: Principles of UDL and Implementation at the Course Level

Multiple Means of Engagement

There are a number of ways in which multiple means of engagement can be incorporated into higher education courses, including variety in teaching and learning activities, use of technology and student choice of course content (Dyjur et al., 2021). Table 1 shows the multiple means of engagement themes in higher education, including some examples of how they can be implemented at the course level and how they align with CAST's (2022) guidelines and checkpoints.

TABLE 1: MULTIPLE MEANS OF ENGAGEMENT THEMES IN HIGHER EDUCATION AND EXAMPLES

Themes	Examples	Alignment with UDL Guidelines and Checkpoints (CAST, 2022)
Variety in teaching and learning activities	Incorporate problem sets, discussions and activities into lectures Embed sample exam questions into lecture notes	Recruiting Interest: Optimize relevance, value and authenticity
Interaction with others	Online discussions Peer review	Sustaining Effort and Persistence: Foster collaboration and community
Engagement with content	Apply new learning in different ways Student-prepared summary notes on readings and lectures	Recruiting Interest: Optimize relevance, value and authenticity
Use of technology	Digital pedagogies Use of learning technologies and online learning environment as a blended approach for small group	Recruiting Interest: Optimize individual choice and autonomy

	work, videos, practice exam questions	
Student choice of course content	Student choice of topic for assignments Optional readings	Recruiting Interest: Optimize individual choice and autonomy
Self-regulation and motivation	Use tools within the learning management system (LMS) such as checklists, news items and practice quizzes so students can monitor their progress (Dyjur et al., 2021)	Self Regulation: Promote expectations and beliefs that optimize motivation (CAST, 2022b)

Multiple Means of Representation

Table 2 shows how different themes of multiple means of representation could be implemented in higher education, along with connections to CAST’s (2022) guidelines and checkpoints.

TABLE 2: MULTIPLE MEANS OF REPRESENTATION THEMES IN HIGHER EDUCATION AND EXAMPLES

Themes	Examples	Alignment with UDL Guidelines and Checkpoints (CAST, 2022)
Accessible course materials	<ul style="list-style-type: none"> • Open Education Resources (OERs) • Use common file formats, websites and tech tools that can be accessed by international students remotely 	Perception: Offer ways of customizing the display of information
Multimodal sources of information	<ul style="list-style-type: none"> • Include text translation for videos • Include alt text for charts and figures 	Language & Symbols: Support decoding of text, mathematical notations and symbols

Pedagogical approaches	<ul style="list-style-type: none"> • Use different pedagogical approaches to topics or concepts, such as logic, statistics, narrative, case study, historical, multiple perspective, and testimonials • Incorporate strategies such as collaborative learning, simulations, self-reflection, group projects, and/or experiential learning, as appropriate 	Comprehension: Guide information processing and visualization
Inclusive materials	<ul style="list-style-type: none"> • Look for materials with demographic diversity, including age, gender, ethnicity and socioeconomic status • Draw upon different disciplines when providing examples 	Comprehension: Activate or supply background knowledge
Student-created materials	<ul style="list-style-type: none"> • Students create a graphic organizer to summarize their understanding of a topic • Students create their own glossary of terms throughout the course 	Comprehension: Maximize transfer and generalization
Comprehension and key concepts	<ul style="list-style-type: none"> • Study guide of key concepts • Post a list of Frequently Asked Questions (FAQs) and responses online 	Comprehension: Highlight patterns, critical features, big ideas, and relationships
Check for understanding	<ul style="list-style-type: none"> • Practice exercises • Small group discussions (Dyjur et al., 2021) 	Comprehension: Maximize transfer and generalization (CAST, 2022)

Multiple Means of Action and Expression

Suggestions for incorporating the third UDL principle, multiple means of action and expression, are highlighted in Table 3, again along with connections to CAST’s (2022) guidelines and checkpoints.

TABLE 3: MULTIPLE MEANS OF ACTION AND EXPRESSION THEMES IN HIGHER EDUCATION AND EXAMPLES

Themes	Examples	Alignment with UDL Guidelines and Checkpoints (CAST, 2022)
Exams	<ul style="list-style-type: none"> • Use various question types on exams, such as multiple choice, matching, and short answer • Exam questions that assess various ways of understanding: remember/ comprehend, analyze/ apply, evaluate/ create 	
Assignments and demonstration of skills	<ul style="list-style-type: none"> • Authentic assessment • Demonstrate skills in different ways such as infographics, debate, simulations 	Expression & Communication: Use multiple tools for construction and composition
Opportunities for feedback	<ul style="list-style-type: none"> • Use question sets from a textbook as practice • Incorporate peer feedback 	Executive Functions: Enhance capacity for monitoring progress
Student choice	<ul style="list-style-type: none"> • Choice of topic for assignments • Choice of assignment format (paper or website) 	Executive Functions: Guide appropriate goal setting
Mitigating assessment anxiety	<ul style="list-style-type: none"> • Low-stakes first assignment with plenty of feedback • Provide examples of assignments with feedback (Dyjur et al., 2021) 	Executive Functions: Enhance capacity for monitoring progress (CAST, 2022)

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