

ATHABASCA UNIVERSITY

A SCOPING REVIEW OF INCLUSIVE ONLINE HIGHER EDUCATION:

LEVERAGING UDL PRACTICES

BY

ROSEMARRI JANE KLAMN

A DISSERTATION

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF EDUCATION IN DISTANCE EDUCATION

FACULTY OF HUMANITIES AND SOCIAL SCIENCES

ATHABASCA, ALBERTA

APRIL 2024

(cc) ROSEMARRI KLAMN

Approval of Dissertation

The undersigned certify that they have read the dissertation entitled

**A SCOPING REVIEW OF INCLUSIVE ONLINE HIGHER EDUCATION:
LEVERAGING UDL PRACTICES**

Submitted by:

Rosemarri Klamm

In partial fulfillment of the requirements for the degree of

Doctor of Education in Distance Education

**The examination committee certifies that the dissertation
and the oral examination is approved**

Supervisor:

**Dr. Constance Blomgren
Athabasca University**

Committee Members:

**Dr. Cindy Ives
Athabasca University**

**Dr. Paul Jerry
Athabasca University**

External Examiner:

**Dr. Elizabeth Childs
Royal Roads University**

April 18, 2024

Dedication

This dissertation is about how a community of faculty, staff, administration, institution, and students can work together to enhance learning for all learners. It takes perseverance and support to complete a doctorate of education in distance education. Encouragement from the Athabasca University community of cohort seven and other cohorts, Faculty of Graduate Studies staff, Education Doctorate Program faculty and staff, teachers, academic librarians and committee members made a difference in helping to achieve this ambitious goal.

I thank my dissertation committee, Dr. Cindy Ives and Dr. Paul Jerry for their encouragement and questions, and my supervisor, Dr. Connie Blomgren, for her endless support and assistance. To my husband, David, thank you for your love and support throughout my doctoral journey.

Abstract

The universal design for learning (UDL) framework was established in 1998 with two associated parts to the framework. The universal design of instruction (UDI) and universal instructional design (UID) learning design practices are related to the UDL framework, yet do not always emerge in research as connected learning practices due to limited search terms connecting them in previous literature reviews. Adding targeted search terms in a scoping review formed a broader picture of UDL, UDI, and UID practices from peer-reviewed and grey literature.

UDL was originally designed to reduce barriers to learning for students with disabilities in learning environments, yet recent investigation has demonstrated that UDL has become associated with the atypical variability that exists across individuals. This dissertation explores how UDL has been researched and implemented since the framework was developed.

A systematic scoping review was conducted. Inclusion criteria involved: (a) peer-reviewed and non-peer-reviewed artifacts; (b) grey literature, including non-peer-reviewed professional or government websites, policy papers, government, and professional publications written by researchers and educators; and (c) artifacts that cite UDL, UDI, and UID practices in an inclusive OHE environment with publication dates from 2000 to 2020. A three-stage process was involved using Zotero software to (a) aggregate a collection of artifacts as described above and establish reliability; (b) distil collection for duplication, review abstracts and executive summaries for inclusion, and sort by research question parameters; and (c) review remaining artifact data in detail and arrange

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

in themes. Recommendations include faculty/institution responsibility for implementation; increased attention to accessibility of course content and instructional design practices, co-creation of knowledge; and involvement of academic librarians as part of a comprehensive strategic plan. This dissertation may contribute to a more in-depth analysis of how UDL/UDI/UID is examined in relation to creating inclusive OHE learning environments for students with disabilities, students from marginalized populations, and all learners. Implementing these recommendations would help realize the benefits of a flexible, inclusive OHE that these practices promise.

Keywords: inclusive education, online higher education, equitable access, digital accessibility, students with disabilities, universal design for learning (UDL), universal design of instruction (UDI), and universal instructional design (UID).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table of Contents

FGS Approval Page	ii
Dedication.....	iii
Abstract.....	iv
Table of Contents.....	vi
List of Tables	ix
List of Figures and Illustrations	x
List of Abbreviations.....	xi
List of Terms	xii
Chapter 1. Introduction	1
Brief History of UDL.....	2
Legal and Ethical Challenges to Accessibility for Students	5
Statement of the Problem.....	10
The Growing Need for Equitable, Digital Access.....	11
Online Distance Education Evolves as a Learning Delivery Model	14
The Foundation and Evolution of UDL	19
My Relationship with Distance Education.....	23
Conceptual Framework	24
Statement of Purpose.....	27
Research Questions	27
Significance of the Study	29
Assumptions.....	29
Limitations	30
Delimitations	32
Definition of Terms	34
Summary	34
Outline of Remainder of Study.....	35
Chapter 2. Review of the Literature	37
Literature Review Process.....	38
Interconnection between Concepts	41
Concept 1: Impact of Disability Model on the Individual Learner.....	41
Concept 2: Equity in OHE and an Inclusive OHE Learning Ecosystem ...	46
Legal Aspects of Accessible Education for Equity	46
Concept 3: UDL Framework and UDI/UID Learning Design Practices	55
The Role of UDL in Learning Design.....	58
The Role of Technology	62

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Summary	64
Chapter 3. Theoretical Framework and Methodology	66
Theoretical Framework.....	66
Overview of Theoretical Framework	67
My Theoretical Positionality	70
Paradigm.....	70
Epistemology, Ontology, and Axiology	71
Methodology.....	73
Scoping Review	73
Research Design	76
Participants	77
Sampling	77
Ethical Considerations	78
Reliability and Validity	78
Results	78
Data Collection.....	81
Stage One.....	83
Stage Two.....	84
Stage Three	84
Data Analysis	85
Data Management Plan	86
Summary	86
Chapter 4. Results	88
General Findings	88
Key Findings.....	97
Faculty Awareness/Attitudes	97
Faculty Training/Support.....	98
Faculty Implementation of Accommodations and UDL Training.....	98
Content/Accessibility	99
Universal Design for Learning (UDL)/Instructional Design (ID) – Predesign.....	100
UDL/ID – Good Pedagogy.....	100
UDL/ID – Student Response	101
Findings - Barriers	101
Faculty Awareness/Attitudes	102
Content.....	103
Findings - Contributors	104
Content.....	104
Implementation of Accommodations and UDL Training	104
Summary	105
Chapter 5. Discussion.....	107
Conceptual Framework	107
Discussion Research Primary Question One.....	107

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Discussion Research Question One(a)	109
Discussion Research Question One(b)	111
Discussion Research Question One(c)	112
Discussion Research Question One(d)	114
Discussion Research Question One(e)	116
Discussion Research Question One(f)	118
Top Findings.....	121
Faculty.....	121
Implementation of Accomodations and UDL Training	122
Content.....	123
UDL/Instructional Design (ID) Predesign	123
UDL/ID Good Pedagogy	124
UDL/ID Student Response	124
Recommendations for Future Research.....	125
Faculty and Institutional Responsibility for Implementation.....	125
Increased Attention to the Accessibility of Course Content.....	127
Increased Attention to Instructional Design Practices	128
Co-Creation of Knowledge	129
Involvement of Academic Librarians	130
Limitations	131
Conclusion.....	133
References	139
Appendix: Reference List from Data Collection	163

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

List of Tables

Table 1 Brain Networks and UDL Practices	22
Table 2 Universal Design Educational Models.....	61
Table 3 Discussion on Understanding Research Paradigms	69
Table 4 Data Collection Process and Protocols	80
Table 5 Data Analysis Inclusion and Exclusion Criteria	81
Table 6 Resulting Articles from Database Search of Articles	90
Table 7 Country of Article Origin on UDL/UDI/UID.....	91
Table 8 Learning Design Principles Discussed	92
Table 9 Beneficiaries of Research Discussed (Faculty, Institution, Students)	92
Table 10 Students with Impairments/Disabilities.....	93
Table 11 Research Methods.....	94
Table 12 Data Collection Techniques	95
Table 13 Articles Written in Five-Year Increments	96
Table 14 Article Affiliation to Search Terms	96
Table 15 Research Question Affiliation to Conceptual Framework	120

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

List of Figures and Illustrations

Figure 1 Illustrating Equality versus Equity 17

Figure 2 Conceptual Framework.....26

Figure 3 Intersection of Conceptual Framework (Chapter 1) and Literature
Review (Chapter 2)40

Figure 4 Resulting Articles from Database Search89

Figure 5 Research Methods.....94

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

List of Abbreviations

ADA	Americans with Disabilities Act of 1990
CAST	Center for Applied Special Technology
CRT	Culturally Responsive Teaching
DE	Distance Education
DMP	Data Management Plan
F2F	Face-to-Face
HE	Higher Education
HyFlex	Hybrid Combination of Online and F2F
ICT	Information Communication Technology
IDEA Act	Individuals with Disabilities Education Act
NCUDL	National Center on Universal Design for Learning
ODL	Open and Distance/Distributed Learning
OHE	Online Higher Education
TDD	Telecommunication for the Deaf
UD	Universal Design
UDI	Universal Design of Instruction
UDL	Universal Design for Learning
UID	Universal Instructional Design
W3C	Worldwide Web Consortium
WAVE	Website Accessibility Evaluation Tool
WCAG	Web Content Accessibility Guidelines

List of Terms

Accessibility for Ontarians with Disabilities Act: Accessibility standards were established provincially, in Ontario in 2005.

Accessibility Standards Act: Canadian legislation was established in 2019 with the *Accessibility Standards Act* designed to enable all persons to participate fully in a barrier-free society.

Americans with Disabilities Act of 1990: In the US, the *Americans with Disabilities Act* of 1990, *Individuals with Disabilities Education Act* of 1997, and subsequent revisions are laws developed to protect persons with disabilities.

Assistive Technology: Enables digital and mechanical access for individuals with physical, cognitive, and sensory disabilities.

Brain Network: The three brain networks are: (a) the Affective Network: the WHY of learning; (b) the Recognition Network: the WHAT of learning; and (c) the Strategic Network: the HOW of learning (CAST, 2020).

Canadian Alliance of Student Associations: CASA is a national voice for Canada's post-secondary students. Established in 1995, CASA is a non-partisan, not-for-profit student organization composed of student associations from across Canada. CASA represents undergraduate, graduate, and polytechnic associations. (<https://www.casa-acae.com/>)

Co-Creating Knowledge: Education reformer Freire (1970) promoted a critical approach to learning as a dialogue between students and educators in co-creating knowledge. This is combined with Dewey's (1933) and Wenger et al.'s (2003) concepts of reflection and creating communities of practice.

Collaborative Learning: Education reformer Dewey (1933) noted the influence of practice and reflective habits as part of a collaborative approach to learning.

Constructivist Learning: Scheer et al.'s (2012) emphasis on constructivist learning and design thinking that details the interactive relationship between learner and their observations.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Curb Cuts: Are associated with UD: A sidewalk curb cut to provide accessibility for people in wheelchairs or walkers also benefits people with strollers, bicycles, delivery carts, and skateboards (Rao & Tanners, 2011). This example is commonly used in universal design discussions and represents a shift from the individual to the environment.

Design Thinking: Outlines the interactive relationship between learner and their own observations

Distance Education: Distance education has shifted from asynchronous communication (usually text-based, with audio or video incorporated into material) to elements of synchronous or *live* communication where students and educators can meet virtually, view a shared presentation, or have a discussion on class topics

Data Management Plan: A data management plan (DMP) was developed in consultation with the AU data management lead librarian using a template called DMP Assistant, an interactive software used by several Alberta universities. The interactive plan allows for the researcher to develop the plan and have feedback from a variety of sources.

Equitable Access: A philosophy and action plan for equitable access meets the needs of students with disabilities and other marginalized and vulnerable populations, both socially and economically (Tate et al., 2014; Weiss, 2021).

Inclusive Education: Has shifted from working with students with disabilities to working with students with racial, ethnic, gender, and sexually diverse backgrounds. Each of these categories is not exclusive as intersectionality exists across each category.

Knowledge Creation: Co-creation of knowledge between learners and educators (Freire, 1970; Wenger et al., 2002) and the concept of expert learners, educators, and systems (Meyer et al., 2014).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Learning Design Practice: UDI and UID learning design practices are related to the UDL framework, yet do not always emerge in research as connected learning practices due to limited search terms in previous literature reviews.

Remote Teaching or Emergency Remote Teaching: Irvine (2020) raised a distinction between hastily prepared lessons to convert classes to Remote Teaching or Emergency Remote Teaching by inexperienced online instructors and highly skilled online or hybrid online instructors who have considerable experience meshing asynchronous and synchronous interaction in online learning.

Students with Disabilities: Many students with disabilities do not disclose their disability due to inequities in cost and detailed institutional accommodation requirements (Kraglund-Gauthier et al., 2014); using UDL practices in online environments still reaches these students and contributes to engagement, motivation, and retention for all learners (Tobin, 2014, 2018).

Universal Design for Learning Framework: The Universal Design for Learning (UDL) framework and learning design practices evolved from the North Carolina State University School of Design architect, product designer, and accessibility advocate, Ronald L. Mace. Mace pioneered the concept of universal design (UD) in the early 1970s by advocating for the legislation of accessible physical buildings and infrastructure that were “aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life” (Center for Universal Design, 2008, para. 2).

Worldwide Web Consortium (W3C): Peters and Bradbard (2010) noted that W3C standards advocate for web accessibility in four domains: social, technical, legal/public policy, and financial.

Website Accessibility Evaluation Tool (WAVE): WAVE tests websites for accessibility by simply inputting the web address of a site that you wish to evaluate WebAIM (n.d.).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Web Content Accessibility Guidelines (WCAG): An international set of guidelines for web accessibility developed by the Worldwide Web Consortium (Spellman et al., 2021; WebAIM, 2020).

Chapter 1. Introduction

Reflect on a time before sidewalks were rounded and you had to stop to raise your stroller, bicycle, or skateboard onto the sidewalk. Imagine trying to do so in a wheelchair. This barrier was rectified by curb cuts that enable easier access for persons with physical disabilities and to all pedestrians. In a similar manner to reduce barriers is the case with Universal Design for Learning (UDL). The UDL framework was developed to reduce obstacles for students with disabilities, which later became known as flexible enough to meet the needs of all learners (Meyer et al., 2014). This dissertation research that is a scoping review of UDL in higher education over a 20-year period examines the benefits that UDL and its associated practices, Universal Design for Instruction (UDI) and Universal Instructional Design (UID) have on an inclusive online higher education (OHE) learning environment. The framework and practices were originally developed to respond to legal challenges in the United States (US), and later in Canada. UDL culture is more highly developed in the US, hence the discussion on history, legal challenges, and other aspects of UDL, UDI and UID practices. These practices evolve from the US context but influence Canadian higher education policies and practice. UDL and its associated practices have been used in K-12 learning environments and less so in OHE learning environments, although this is changing over time (Al-Azawei et al., 2016; Roberts et al., 2011). It is logical that as K-12 students are already exposed to UDL in their studies, they would have a higher expectation of a flexible learning environment. Thus, higher education

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

institutions have begun to examine the legal, ethical, and strategic necessities of initiating flexible learning practices for both competitive and altruistic reasons.

Provided in this chapter is the history and background of the UDL framework and UDI/UID practices; and legal and ethical challenges related to increasing equitable access to students with disabilities. A statement of problem includes the growing need for equitable, digital access; online distance education that evolves as a learning delivery model; the foundation and evolution of UDL; and my relationship with distance education. This is followed by an examination of the theoretical underpinnings and a conceptual framework of the research study; and purpose of the research study. Research questions are discussed, followed by assumptions, limitation, delimitations, definition of terms, summary and outline of remainder of study.

Brief History of UDL

UDL has been researched in a variety of ways, although not extensively or comprehensively. Al-Azawei et al. (2016) used “UDL” for search terms to research the potential for UDL-based instructional design to reduce barriers for all learners in a study of secondary school students, undergraduate students, and teacher candidates. Roberts et al. (2011) used the search terms “UDL, UDI, and UID” in postsecondary education to research how these learning strategies help create diverse learning environments in an increasingly diverse student population. Reviews of literature surrounding how UDL is used have been conducted (Al-Azawei et al., 2016; Rao & Tanners, 2011; Roberts et al. 2011); however, no comprehensive review of the connection between UDL, UDI, and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

UID practices has been published to provide an overview of the impact of these practices on equitable access and digital accessibility in an inclusive online HE learning environment.

The UDL framework and learning design practices evolved from the North Carolina State University School of Design architect, product designer, and accessibility advocate, Ronald L. Mace. Mace pioneered the concept of universal design (UD) in the early 1970s by advocating for the legislation of accessible physical buildings and infrastructure that were “aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life” (Center for Universal Design, 2008, para. 2). The notion of “curb cuts” (Rao & Tanners, 2011, p. 211; see also Seale, 2014) is associated with UD: A sidewalk curb cut to provide accessibility for people in wheelchairs or walkers also benefits people with strollers, bicycles, delivery carts, and skateboards (Rao & Tanners, 2011). UDI and UID, along with UDL are based on the UD concept. According to Burgstahler (2020), they are applied to instructional design and practice that:

consider the potential variation in individual skills, and preferences, age, gender, sexual orientation, culture, abilities, and disabilities as they select appropriate content and strategies for the delivery of instruction and then apply universal design to all course activities and resources. (UDI Examples section, para. 1)

The concept of UDL emerged as a response to legal challenges in the United States (US) around the Individuals with Disabilities Education Act (IDEA)

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

of 1997 (as cited in Edyburn, 2010, p. 33). Edyburn (2010) elaborated on UDL and other learning design features that improve the learning experience for students with disabilities. Peters and Bradbard (2010) discussed and divided disabilities that affect learning into four broad categories: visual, auditory, cognitive, and motor impairments and profile how each of these categories affects learning. The authors elaborated on web accessibility and assistive technology as a learning design strategy that institutions can adopt to improve how students with disabilities learn, meeting both legal and ethical considerations of their students.

Peters and Bradbard (2010) listed numerous assistive technologies to assist students with learning disabilities. Tools such as screen magnifiers, screen readers, and speech recognition software allow computer users with visual impairments to input and listen to the data they create. Telecommunication for the Deaf (TDD), closed captioning, and lighter signifiers assist individuals who are hearing impaired communicate via phone or computer. Reading tools, speech recognition software, spell, and grammar checkers, writing organizers, prompters, and email reminders help individuals with cognitive impairments. Alternate pointing devices, on-screen keyboards, predictive dictionaries, and speech recognition programs aid users with motor impairments. These technological tools are used in many ways in different learning environments, although, as King-Sears (2009) noted, the optimum value of these tools is most effective in combination with pedagogy or instructional practices such as UDL.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Discrepancies exist between the strategies used in individual schools, school districts, and states or provinces due to differences in federal and state or provincial funding. School boards make funding allocation and service accessibility decisions as do colleges and universities (Canadian Association of University Teachers, 2021; Canadian School Boards Association, n.d.; Government of Canada, 2019; McKenzie, 2019c; US Department of Education, 2022). These decisions are made according to federal, state, or provincial legal laws and requirements, which can be vague. Advocacy elevates the topic of equitable web access to education as significant to providing an inclusive OHE learning environment (Canadian Association of University Teachers, 2021; King-Sears, 2009; McKenzie, 2019b; Peters & Bradbard, 2010). Canada updated its commitment to accessibility with the *Accessible Canada Act* to make Canada barrier-free by January 1, 2040.

Legal and Ethical Challenges to Accessibility for Students

In 2004, the terms “universal design” and “universal design for learning” were defined and written into a new iteration of the American 2004 IDEA Act and subsequently in the 2008 Higher Education Opportunity Act (Edyburn, 2010, p. 34). The IDEA Act required every state to ensure a “free appropriate public education (FAPE) for all students with disabilities” (US Department of Education, 2011, Introduction, para. 1) while providing similar yet separate educational services to private schools such as Parentally Placed Private School Students with Disabilities that receive funds for “equitable” education services (Introduction, para. 2). IDEA federal funds for private schools were not always

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

administered equitably due to lack of consistent consultation services (Introduction, para. 3). This was rectified in 2006 with new regulations as Part B of the IDEA Act to help state and local education agencies understand how to provide appropriate educational services to children in private schools (para.4). In a similar manner, the Accessible Canada Act of 2019 aims to provide a barrier-free society through including both the built environment and information and communication technologies that affect education at all levels.

Edyburn (2010) noted American students had gained physical access to classrooms, yet institutions lacked a unified strategy for students to gain access to the “general curriculum” (p. 33), due to inconsistencies in physical and technological access to education. This led to increased interest in inclusive education and development of UDL by the research community at the Center for Applied Special Technology (CAST) that was founded in 1984. CAST focused on “brain development, learning, and digital media” (Edyburn, 2010, p. 34), and the concept of a “disabled” curriculum instead of “disabled” students (Edyburn, 2010, p. 34).

Understanding how UDL has been researched and practiced since the framework was developed in 1998 may contribute to how UDL/UDI/ UID has led to equity and inclusion as part of instructional design. UDL/UDI/UID practices encourage design and co-creation between learners and educators. Adopting similar practices may improve equitable access and digital accessibility to all students in OHE learning environments.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

UDL began as an educational framework in response to legal considerations to provide better access to learning for students with disabilities. Since its inception in 1998, UDL has been practiced in K–12 and postsecondary classrooms and in distance education, blended, and online formats. Yet, there is limited empirical data on how UDL has been adapted to create equal online learning opportunities to increase equitable access to students with disabilities and all learners in higher education learning environments (Al-Azawei et al., 2016; Roberts et al., 2011).

Laws governing the extent of support to persons with disabilities vary between the US and Canada and between states and provinces.¹ There are national and international laws governing the rights of persons with disabilities such as the *Americans with Disabilities Act (ADA)* of 1990; *Constitution Act of Canada* of 1982; *Canadian Charter of Rights and Freedoms*, Section (15-1); the *US Individuals with Disabilities Education Act (IDEA)* of 1997; and the UN Department of Economic and Social Affairs Disability's (2006) *Convention on the Rights of Persons with Disabilities*, Article 9. These laws and declarations require action to offer accessible education to people. The online environment requires compliance with *Web Content Accessibility Guidelines* (Spellman et al., 2021), an international set of guidelines for web accessibility developed by the Worldwide Web Consortium (WebAIM, 2020).

¹ Provincial list of accessibility legislation in Canada is not readily available. Please see this blog post for details: <https://www.trufla.com/blog/a-provincial-guide-to-accessibility-laws-in-canada>

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Technology is essential in the online environment, as it may increase accessibility for students with disabilities and other learners as well (Seale, 2014; Tobin, 2014). While the institution is legally responsible for accessible course materials, it takes time to provide completely accessible digital course materials to students, either in-house or through course publishing companies. Some colleges and universities in the US and Canada have experienced accessibility complaints and legal challenges by students who were not able to access the software used by educational publishers in course materials (Alberta Human Rights Commission, 2018; McKenzie, 2019c). Despite complex accessibility checklists, McKenzie (2019c) noted issues still occur if the institution does not insist on stronger procurement practices so only fully accessible software is purchased (p. 5). McKenzie (2019a) noted that how the educational institution responds to legal challenges can make a difference in reputation. As one example, the Atlantic Cape Community College's response to a legal challenge by visually impaired students resulted in a positive change in institutional culture around accessibility and an increase in student registration (McKenzie, 2019a, p. 24).

Peters and Bradbard (2010) noted many assistive technologies are available to businesses and institutions, yet these are not readily embraced by organizations. Their 2010 study was primarily aimed at businesses; however, they provide advice on web accessibility education from a managerial and web design perspective. In addition to creating a table of assistive technologies for different types of disability, the authors created a table of practical applications to

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

encourage managers to discuss the legal and ethical implications to their organization of implementing appropriate assistive web technologies. The practical applications include examination of requirements, such as (a) cost-benefit analysis, (b) maximize the benefit for all stakeholders, (c) universal acceptability, (d) the publicity test, and (e) rights of affected parties (p. 220). Educational institutions may philosophically place ethics above legal considerations; however, these institutions operate as businesses in terms of sustainability. McKenzie (2019b) noted the University of California, Berkley's decision to "remove thousands of educational videos from public view in 2017 after the U.S. Justice Department ordered the university to provide captions" (p. 19). McKenzie further emphasized that this decision "highlighted the financial and administrative burden placed on universities by web-accessibility requirements" (p. 19), despite criticism from disability rights advocates.

Seale (2014) noted that meeting the needs of students by developing accessibility tools and practices should take precedence over simply adhering to legislation and rules. There are legal and ethical intentions for how access to education is understood and how that affects actions and behaviours within a society (Peter & Bradbard, 2010). Achieving equitable access is situated in what this means and how it is practiced within and across society. A philosophy of equitable access meets the needs of students with disabilities and other marginalized and vulnerable populations, both socially and economically (Tate et al., 2014; Weiss, 2021).

Statement of the Problem

Numerous factors contribute to the need for this scoping review. These factors increase the higher education institution's ability to enhance student success (Hitch et al., 2019; King-Sears et al., 2023). Increasing enrolment in online distance education is one factor to design courses that reflect the diversity of postsecondary populations, including students with disabilities (Rao & Tanners, 2011). Another factor is access to education for more people who choose to work, have families, and attend school without having to move near a HE institution in a physical environment (also known as brick and mortar) (Rao & Tanners, 2011; Tobin, 2014).

Many students with disabilities do not disclose their disability due to inequities in cost, concerns of stereotypes, discrimination, and detailed institutional accommodation requirements (Kraglund-Gauthier et al., 2014); using UDL practices in online environments still reaches these students and contributes to engagement, motivation, and retention for all learners (Tobin, 2014, 2018). Many institutions require psychological educational evaluations for adults that are expensive; a transition from evaluations for those under 18, whose evaluations are covered by parents and schools. HE institutions will also face a growing number of students who have been educated in K-12 using UDL (National Society of High School Scholars, 2011; Wells, 2022). These students would likely have higher expectations of online environments that enable engagement and flexibility in how their learning is presented and assessed (King-Sears, 2009; Schelly et al., 2011; Smith, 2012; Tobin, 2018). King-Sears (2009)

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

reinforced the need for combining pedagogy and technology features when online courses are designed so students have “different, but not necessarily separate, choices” (p. 201).

Azawei et al. (2016) conclude that distance education cannot meet the needs of learners with other impairments without attention to flexible and supportive technology and learning strategies. This became evident once the COVID-19 pandemic forced many HE institutions to move to an online model (Schleicher, 2020).

The issues discussed in this section led to a decision to design an enhanced scoping review as a research method for my research. A scoping review is intended to mine for literature that has not been comprehensively reviewed, paving the way for a more precise systematic review that researchers may use to target gaps in data synthesized from a scoping review. Peters et al. (2015) noted scoping reviews can be conducted to identify research gaps, summarize, and disseminate research findings, and make recommendations for further research.

The Growing Need for Equitable, Digital Access

HE institutions face competition from other institutions nationally and internationally and face a growing number of learners who choose distance education as a means of fitting education into their lives (Rao & Tanners, 2011; Tobin, 2014, 2018, 2019). When the COVID-19 pandemic forced the closure of in-class learning, HE institutions shifted to an online model, for which many institutions were ill-prepared to deliver instructions, assignments, and exams

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

(Schleicher, 2020, p. 10). International students were especially vulnerable as there were legal repercussions for their status as full-time students, and the transition to hastily devised online learning formats was more difficult with language and cultural differences. Schleicher (2020) noted many HE institutions that charge higher fees for international students will lose an important revenue stream if they cannot provide better online learning as the COVID-19 pandemic continues (p. 9). Schleicher clearly preferred face-to-face (F2F) learning, especially for international students to experience life and make connections in other countries. The author recognized the importance of expanding intelligent digital learning systems that they saw as elevating the role of skilled educators as co-creators of knowledge, coaches, and mentors (p. 16). The flexibility of UDL would help elevate the role of skilled educators to develop supportive educational strategies for online learners.

Online courses that enable equitable access reveal the need to be designed to reflect the diversity of HE populations with strategies that are flexible and supportive of educational practices such as UDL (Jimenez et al., 2007; Meyer et al., 2014; Rao & Tanners, 2011; Seale, 2014). UDL was originally designed to reduce barriers to students with disabilities in learning environments, a viewpoint associated with the systemic variability that exists across how individuals learn (Meyer et al., 2014).

Technology aids teaching practices such as differentiated instruction (Hall et al., 2003; Kraglund-Gauthier et al., 2014; Tomlinson, 2014) by offering diverse methods of delivering information to students for learning, engagement, and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

evaluation in an online learning environment. This mindset is in line with UDL practices that help improve learning experiences by creating multiple means of presenting information, engaging students, and demonstrating knowledge and skills through inclusive assessment and evaluation.

A growing trend to help busy adult learners who are balancing work, family, and education is to develop interactive course materials in an online format that increase digital accessibility anytime, anyplace, and on any device (Tobin, 2014). Tobin (2014) referred to this as time shifting, place shifting, and screen shifting. Accessing course material on a mobile phone in a variety of formats allows learners to study anytime, anywhere using any time they have available. Although this is improving, there are still some users, such as the visually impaired community, that do not have complete access to mobile technology due to shortcomings of mobile phone software development (Khan & Khusro, 2021; Mt. San Antonio College, Prominence of Mobil Technology & Apps, 2024). Tobin suggested strategies for incorporating UDL practices into course development “to give learners different paths to course content, different ways to demonstrate their skills, and multiple means of staying engaged with the content, each other, and the instructor” (p. 15). Edyburn (2010) noted numerous UDL practices have been incorporated into teaching practice, without being recognized or followed as UDL practices.

Meyer et al. (2014) noted the UDL framework and UDI/UID practices contribute to equitable access and collaboration in creating an inclusive online learning environment. These learning design practices require a system that

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

supports community, relationships, and mediated dialogue in the role of co-creating knowledge. This collaborative process is reflected in the conceptual framework discussed later in this chapter.

Online Distance Education Evolves as a Learning Delivery Model

Distance education has shifted from asynchronous communication (usually text-based, with audio or video incorporated into material) to elements of synchronous or *live* communication in an online environment where students and educators can meet virtually, view a shared presentation, or have a discussion on class topics. Other modes of learning such as blended on-campus, face-to-face (F2F) classes with online activities or hybrid learning have emerged. These minimize time in a physical classroom space, while offering more time and flexibility to complete assignments (Irvine, 2020). These modes refer to the timing and location of student-educator interaction, which is increasingly important in learning design. Irvine noted other emerging modalities such as HyFlex, a hybrid combination of online and F2F, are flexible systems where students choose to attend sessions, a highly touted post-COVID-19 pandemic learning design that can be problematic to implement. Irvine raised a distinction between hastily prepared lessons to convert classes to remote teaching or emergency remote teaching by inexperienced online educators and highly skilled online or hybrid online educators who have considerable experience meshing asynchronous and synchronous interaction in online learning. Bates (2021) discussed the necessity for increased access and bandwidth, along with the use of UDL practices to

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

increase accessibility for online learners, especially once the COVID-19 pandemic moved learning to an online format.

The flexibility of an open and online distance education, coupled with digital accessibility and institutional supports, allowed me as a student, along with numerous other students during the recent COVID-19 pandemic, to manage assignments and exams virtually. As many adult students were isolated in their own homes, with children or grandchildren who formerly attended school full-time, the flexibility of an open and online distance education was invaluable in helping students complete their courses. My home institution focused on meeting the needs of students where they were in their education, taking home circumstances into consideration, rather than adhering to strict rules and processes that limit learning for students (Seale, 2014). This was done by increased communication with students regarding their circumstances and providing solutions to some issues they may have encountered. This was a difficult time for students and staff, yet adjustments were made quickly as a virtual infrastructure with flexible modes of learning already existed (Irvine, 2020).

Online distance education can help learners marginalized by time, place, and space who cannot attend full-time studies at a traditional educational institution. Online distance education, however, cannot meet the needs of most learners with physical, cognitive, or mental impairments that interfere with their ability to engage with the learning environment and require supports to access information without attention to equitable access (Seale, 2014); digital accessibility (Bates, 2021; Seale, 2014; Tobin, 2014); and flexible, supportive

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

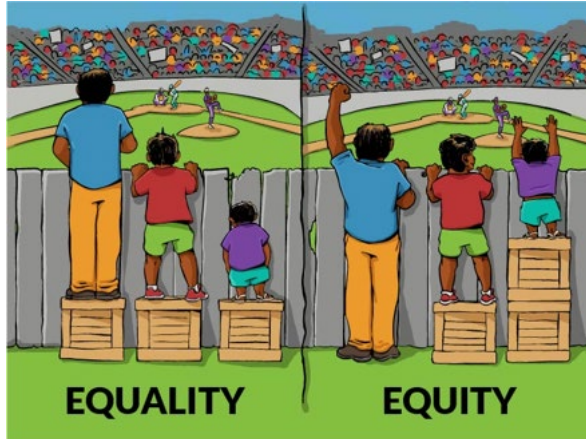
educational practices such as UDL (Bates, 2021; Hall et al., 2012; Jimenez et al., 2007).

Equal or equitable access to education is an ideal that has been discussed for decades (Bozkurt, 2019; Freire, 1970; Tobin, 2018), sometimes in the context of social justice. This is especially so in the early generations of distance education and now online education. The terms equity and equality are sometimes used interchangeably; these are similar concepts with important distinctions. The Milken Institute of Public Health (2020) noted one distinction: “Equality means each individual or group of people is given the same resources or opportunities. Equity recognizes that each person has different circumstances and allocates the exact resources and opportunities needed to reach an equal outcome” (para. 2).

Mlaba’s (2021) definition is used to profile the concept that equality cannot be achieved without equity, presented in a discussion on resource allocation that applies to resources like global vaccine distribution and could apply to access to education. Mlaba described *equality* as people having the same amount of resources regardless of what they have or do not have, while *equity* is about sharing resources based on individual need using Angus Maguire’s well-known illustration of equity versus equality of three individuals peering over a fence as an example (as cited in Interaction Institute for Social Change, 2016, Image 1). These concepts are illustrated in this section (see Figure 1).

Figure 1

Illustrating Equality versus Equity



Note: Illustrating Equality versus Equity. Artist Angus Maguire. “Interaction Institute for Social Change. This image is free to use with attribution. Creative Commons: Attribution-ShareAlike 4.0 International. (CC BY-SA 4.0). For online use please provide links: <https://interactioninstitute.org/illustrating-equality-vs-equity/> and <http://madewithangus.com/portfolio/equality-vs-equity/> and <https://creativecommons.org/licenses/by-sa/4.0/>

Three individuals of different heights trying to peer over a fence are shown in Figure 1. To treat them *equally* would mean giving them the same size box to stand on, which does not help the shortest person to see over the fence. As the individuals are different heights, standing on the same size boxes does not help the smallest individual to see over the fence. To treat them *equitably* would be to give them the right size box to allow each individual to peer over the fence (Mlaba, 2021, para. 5). The tallest individual does not need a box; the middle-

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

sized individual needs one box, while the smallest individual has two boxes to make them tall enough to see over the fence.

This ideal stems from an egalitarian concept, or a social philosophy, that advocates the removal of inequalities of people, especially with respect to social, political, and economic affairs (Merriam-Webster, n.d.). Bozkurt (2019) noted the egalitarian approach to education is reflected in the early and subsequent stages of distance education (DE), which sought to equalize education for people by offering education from a distance. Bozkurt discussed the history of DE that moved individual student-educator interaction from didactic print and mail (i.e., correspondence) learning to more advanced and immediate student-educator interaction through increasingly advanced technology (i.e., visual-auditory and computer-based). DE was intended to reduce barriers for adults who could not attend school full-time, such as “women, workers, and farmers...[to] redress social injustices and decrease rates of literacy by providing common people with access to learning” (p. 254). In the early 2000s, advancements in technology and Internet connection led to synchronous interaction between students and educators with blended and hybrid forms of distance learning that met the needs of learners, including groups on campus, remote groups, and dispersed remote individuals (Irvine, 2020, p. 45).

Bozkurt (2019) noted that open and distance/distributed learning (ODL) is an extension of DE as an educational philosophy that highlights learners’ choices in how DE is delivered through print or online, place, pace, or space. Without further research, how equitable or accessible ODL is in its relationship to UDL

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

has not been clearly stated in the literature. Both ODL and UDL have roots in equity and social justice (Bozkurt, 2019; Cash et al., 2021; Mihal, 2017; Novak, 2021; Vankatesh, 2015), which connect learning design concepts to frameworks that work to remove barriers to learning for all learners and achieve an inclusive OHE.

The Foundation and Evolution of UDL

Online distance/distributed learning builds on the concept of DE that evolved into learning design strategies like UDL/UDI/UID to create and help support an inclusive OHE (Cash et al., 2021; Novak & Thibodeau, 2016). The foundation of my research emerged from the work of Meyer and Rose (Hall et al., 2003; Hall et al., 2012; Rose et al., 2010) on UDL practices, which were then expanded by staff associated with the Center for Applied Special Technology (CAST) and the National Center on Universal Design for Learning (NCUDL). CAST and NCUDL are the main sources of information, research, and public policy on UDL in the US. Both Meyer and Rose are prolific researchers and writers, working with and mentoring internationally recognized practitioners, such as Hall, Novak, Johnston, and Burgstahler. CAST and NCUDL research are predominantly focused on pre-service and practicing K-12 educators, although the CAST “UDL in HE” site profiles 28 colleges and universities in North America that have UDL initiatives (CAST, n.d.-e). Canada does not have a national UDL database, although Canada’s McGill University is represented on the “UDL in HE” site (CAST, n.d.-e). A discussion on Canadian scholars involved in research

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

on accessibility, inclusiveness, and UDL follows in the Chapter 2 literature review.

The seminal text for this dissertation on UDL practices was Meyer et al.'s (2014) *Universal Design for Learning: Theory and Practice*. Meyer and Rose are co-founders of CAST and shapers of the UDL framework that debuted in 1998 (CAST, n.d.-b). The third author, Gordon, Senior Editor for Publishing and Communications for CAST, has been associated with CAST since 2004 and has written five books on special education policy and the digital classroom (CAST, n.d.-c). The work of these scholars contributed to the design of my research as pivotal in development of the UDL framework and emerging learning design practices that contribute to equitable access to inclusive OHE for students with disabilities and other learners. The print copy of the book provides educators with practical examples of UDL, as it contains multiple means of representing the design and practice techniques common in UDL, with audio and video versions available to utilize diverse forms of representation, engagement, and assessment.

UDL was originally designed to make education more accessible for students with physical and learning disabilities. According to Meyer et al. (2014), the CAST team originally focused on using the UDL framework to create individual digital books for their students to help them overcome the learning challenge each disability presented. This was later adapted to one digital book that included the digital tools to help many students with different disabilities. Meyer et al. noted the CAST team realized the students were still required to

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

respond to the curriculum: that is, “learning goals, the means of assessment, the teaching methods, and the materials” (p. 3), regardless of their disability.

Reflecting on the curricula that was originally designed for the printed book and needs of the “average learner” (p. 4), the CAST team realized all learners have variable learning needs and were forced to learn in one prescribed manner. In the early 1990s, the CAST team adapted the UDL framework to reflect the typical and atypical differences in all learners. The curriculum focused on individual differences, with corresponding curriculum changes as research progressed to scientific recognition of normal variability in learning that exist across populations (p. 9). These changes in the neural networks of the brain are predictable enough that engagement, processing, and learning strategies can be developed to improve learning for all students. Meyer et al. (2014) noted that a better understanding of the continuum of variability that exists across individuals and the context in which they are learning can contribute to curriculum planning in advance that is flexible to allow for students’ abilities and reduce barriers to learning (p. 10).

The chart presented in Table 1 was adapted from the UDL guidelines that describe the neural networks and how options can be provided to all learners with systematic, yet flexible guidelines for learning design. This adaptation of Meyer et al. (2014) and CAST (n.d.-a) UDL practices is consistent with how the UDL framework is visualized and described. The table contains four columns and three rows. The column headings from left to right are Brain Networks, Question,

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Solution, and UDL Principle. These relate to the row headings labeled Affective, Recognition, and Strategic Networks.

Table 1

Brain Networks and UDL Practices

Brain Network	Question	Solution	UDL Principle
Affective Networks THE WHY OF LEARNING (Green font)	How do we motivate, engage, or interest students?	Find a way to connect student's interests with <i>options for recruiting interest, self-regulation or sustaining effort and persistence</i>	Create <i>purposeful, motivated learners</i> ; provide multiple means of ENGAGEMENT with the material
Recognition Networks THE WHAT OF LEARNING (Purple font)	How do we process information?	Present information in different ways with <i>options for comprehension, language, or perception</i>	Create resourceful, <i>knowledgeable learners</i> ; provide multiple means of REPRESENTATION
Strategic Networks THE HOW OF LEARNING (Blue font)	How do we express our ideas?	Differentiate the ways students can express what they know with <i>options for executive function, expression and communication, or physical action</i>	Create <i>strategic, goal-oriented learners</i> ; provide multiple means of ACTION and EXPRESSION

Note: Adapted from Meyer et al. (2014) and CAST (n.d.-a) Universal Design for Learning. Permission granted for attribution.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Meyer et al. (2014) noted the UDL framework and UDI/UID practices contribute to equitable access in an inclusive environment through a collaborative process. This requires a system that supports community, relationships, and mediated dialogue in the role of co-creating knowledge. The researchers described the concept of expert learning as continuous development by a combination of students, educators, and systems. They noted, “For students, the focus of learning is the general curriculum; for educators, the focus is on teaching about learning; and for the system as a whole, the focus is on fostering collaboration and community to maximize learning opportunities” (p. 23).

My Relationship with Distance Education

The research flows from my interest in helping learners who are marginalized by time; place; space; physical, mental, or speech impairments; literacy; race or ethnicity; gender; and/or socioeconomic status (Jenson, 2000; Pliner & Johnson, 2004; Tate et al., 2014; United Nations, Department of Economic and Social Affairs Disability, 2006). Distance education allowed me to obtain a quality, postsecondary education in blended and online formats, as my life evolved as a parent, partner, and employee through regular moves to both urban and rural communities. My work as a career development, human resource, and human services professional, policy analyst, and educator has reinforced the value of distance education to meet the needs of learners marginalized by time, place, and space: those who cannot attend full-time studies at a traditional educational institution.

Conceptual Framework

Academic literature assembled from the three concepts of the impact of a disability model on the individual learner; equity in OHE and an inclusive OHE learning ecosystem; and the UDL framework and UDI/UID learning design practices discussed in the literature review forms the basis of a framework.

These concepts cover philosophy, learning ecosystems, pedagogical frameworks and practices, knowledge creation, and the individual learner. These were reoccurring themes in the literature review. Themes that support the individual learner include concepts also derived from the literature review. These include:

- Philosophy of Equity in Education: Critical Pedagogy (Freire, 1970), Pragmatism (Dewey, 1933; Goldkuhl, 2012);
- Inclusive OHE Learning Ecosystems: part of a learning environment of institutions; policies; technology/web; pedagogy; physiology; and individual learner, teacher, and community. This connects to the concepts of “UDL Expert Systems” (Meyer et al., 2014, p. 23), Communities of Practice (Wenger et al., 2002), and Constructivist Learning (Scheer et al., 2012);
- UDL Framework: supported by UDL Framework of Neural Networks for Learning (Meyer et al., 2014);
- UDI/UID Practices: Equitable access, learning design, and practice (Burgstahler, 2013, 2017);

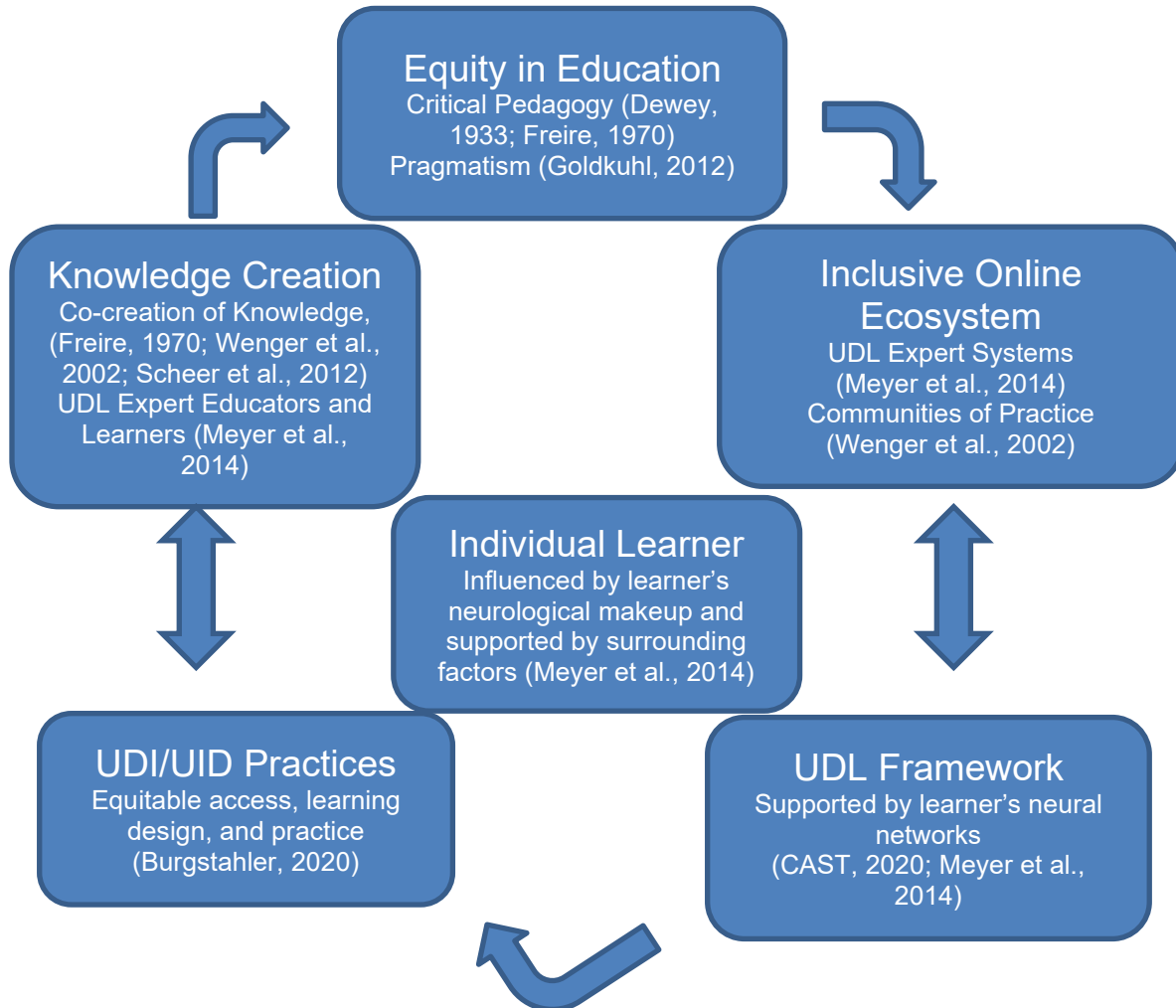
SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Knowledge Creation: co-creation of knowledge between learners and teachers (Freire, 1970; Wenger et al., 2002) and the concept of expert learners, teachers, and systems (Meyer et al., 2014);
- Individual Learner: variability in a living organism, variable yet predictable to a certain degree based on a learner's neurological makeup. (Meyer et al., 2014).

The following conceptual framework connects the examination of how the UDL/UDI/UID practices have been researched and practiced in an inclusive OHE environment. The theoretical framework for my research is based on Freire's (1970) concept of critical pedagogy; Dewey's (1933) concept of practice knowledge; Wenger et al.'s (2002) concept of communities of practice; Scheer et al.'s (2012) constructivism; Meyer et al.'s (2014) UDL framework and concept of expert learners, teachers, and systems; and Burgstahler's (2017) and Burgstahler et al.'s (2020) UDI/UID practices that contribute to an understanding of co-creation of knowledge. The process flow of the conceptual framework presented in Figure 2 depicts concepts to support the box labeled individual learner, who is presented at the centre of the framework. Five boxes surround the individual learner box and describe from left to right: (a) equity in education, (b) inclusive online ecosystem, (c) UDL framework, (d) UDI/UID practices, and (e) knowledge creation. Each box includes a description of the specific scholars' paradigm, or worldview, that supports the concept and ultimately the learner.

Figure 2

Conceptual Framework



Note: Created by Rosemarri Klamn, EdD candidate. Adapted from critical pedagogy, pragmatism, constructivist design thinking, communities of practice, UDL Framework, UDI/UID practices, UDL expert learners, teachers, and systems concepts as noted in the description.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Statement of Purpose

The purpose of the research is to explore how UDL has been practiced since the framework was developed in 1998. UDI/UID practice relates to how the UDL framework has contributed to equity and inclusion as part of instructional design and the co-creation of knowledge between learners and practitioners. I sought a greater understanding of inclusive OHE learning environments, UDL/UDI/UID practices, and the instructional design factors that can influence equitable access, including identifying the barriers and key contributors to equitable access and digital accessibility, and the concept of co-creating knowledge in establishing UDL/UDI /UID practices that may lead to improved inclusive OHE learning environments for all students. This is critical research considering the increased necessity for an inclusive OHE higher education in an increasingly diverse society (Aquino, 2016; Haug, 2017).

Research Questions

The research questions relate to gaining a greater understanding of UDL in an inclusive OHE and factors that contribute to equitable access, digital accessibility, and co-creation of knowledge. The primary research question informed the study: “What is known from the existing literature about the Universal Design for Learning (UDL) framework and the practices of Universal Design of Instruction (UDI) and Universal Instructional Design (UID) and their connection to inclusive OHE learning environments?” The following are subquestions related to the primary question.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Discussion Research Question One (a)

- What does the literature reveal about how UDL/UDI/UID practices, and how inclusive OHE learning environments been defined?

Discussion Research Question One (b)

- What is the contribution of UDL/UDI/UID in equitable access and digital accessibility to inclusive online learning for students with disabilities and other marginalized students?

Discussion Research Question One (c)

- What does the literature reveal about barriers affecting equitable access and digital accessibility to inclusive online learning for students with disabilities and other marginalized students in OHE learning environments?

Discussion Research Question One (d)

- What does the literature reveal about key contributors to equitable access and digital accessibility to inclusive online learning for students with disabilities and other marginalized students in OHE learning environments?

Discussion Research Question One (e)

- How have UDL/UDI/UID instructional design practices been applied in inclusive OHE learning environments? Are there demonstrated gains for students with disabilities, other marginalized students, and/or all learners?

Discussion Research Question One (f)

- How is UDL's role in increasing awareness or practice of co-creating knowledge in inclusive OHE learning environments among educator, student, and content described in the literature?

Significance of the Study

The significance of this research, and the method chosen to analyze the data, is that it will create data to inform HE educators, educational developers, instructional designers, and administrative and education leaders about effective means of UDL implementation in an online OHE that helps them (a) meet legislation governing the rights of persons with disabilities and other educational needs, and (b) create learning environments that enable successful student performance. It is also significant that the UDL/UDI/UID practices are examined in the context of contributing to a flexible higher education learning environment for students previously exposed to these practices in K-12. This connects to the purpose of the research, which is to examine how the UDL/UDI/UID practices contribute to an inclusive OHE learning environment and factors that influence equitable access and digital accessibility.

Assumptions

The decision to use a scoping review for this research was to capture gaps in data not previously explored. This is based on my positionality as a pragmatic researcher for my research to address practice issues, although I also have an affinity for elements of interpretivist/constructivist and a critical/transformational paradigm. The choice of literature is rooted in social

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

justice. My research consists of a scoping review of peer-reviewed and grey literature generated by development of UDL, UDI, and UID learning design practices. The goal was to collect and synthesize peer-reviewed and grey literature publications citing the UDL framework and UDI/UID learning practices between 2000 and 2020 as practiced in inclusive OHE learning environments. Data were synthesized into themes that describe how UDL/UDI/UID learning design practices may contribute to an inclusive OHE learning environment.

I modeled appropriate accessibility behaviour by using the accessibility feature in the word processing program to find practices such as alternate text, logical document structure, data table headers, caption/transcripts, and accessible content in the writing and presentation of this dissertation. I researched current and promising practices in using web accessibility in presenting the study (Athabasca University, 2013, 2022).

Limitations

One limitation of my research was the number of digital resources available through Athabasca University (AU), as not all journals were covered. Digital resources through the AU library do not include all journals and sources available through closed journal databases; which limited the number of research artifacts. AU has interlibrary loan services; however, some delays in receiving digital resources to meet inclusion criteria occurred, notations were made, though material was not included in the data collection/analysis process.

Widening the search criteria increased the amount of data received from mining databases and journals for both peer-reviewed and grey literature. This in

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

turn increased the need for strategic data management using targeted search terms and inclusion criteria; as well, the use of Zotero software to capture and analyze information added to the reliability, validity, and knowledge dissemination of the data analysis.

Considering the number of sources available on open and closed journal databases, there was a mass of research artifacts available for one researcher to review. It was not possible to obtain a second coder to validate data, as the dissertation and research process is time-consuming. Using Zotero, as a form of coding, and following an *a priori* process increased the reliability and validity of the data that I analyzed. Using the *a priori* process helped overcome potential bias due to my positionality as an educator who completed most of their higher education and professional activities in an online format.

Grey literature is considered a variety of literature not commonly published through traditional scholarly channels (Cooper et al., 2019, p. 2). Cooper et al. (2019) noted grey literature may include conference papers, dissertations, and technical reports that may be found in institutional repositories or government websites. Grey literature is not always non-peer-reviewed, and the level of peer review may vary greatly from “cursory to a full double-blind review” (p. 2). Rather than academic researchers, grey literature may be developed by practitioners or policymakers who observe and recognize the value of UDL, UDI, and UID practices. Grey literature may also include research-in-process that has not been submitted for a formal peer-review process, which is time-consuming. Utilizing

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

grey literature can point to educational trends to improve learning environments as they are being developed.

The purpose of including grey literature in my research was the number of anticipated working or policy papers that may be available related to this research on UDL, UDI, and UID learning design practices in inclusive OHE learning environments, especially as UDL emerged 24 years ago and has not always been included in conversations about inclusive OHE. Despite expanding the search terms, there was no grey literature of value that emerged from data collection.

Delimitations

The delimitation of my research limits data analysis in the scoping review to UDL/UDI/UID practice in inclusive OHEs. UDL has been practiced in various learning environments, especially with K–12 pre-service teachers (Rao & Tanners, 2011). Rao and Tanners (2011) noted that UDL has been researched in K–12 pre-service teachers more than in higher education environments. Schelly et al. (2011) and Smith (2012) suggested Grade 12 students moving to higher education will have higher expectations of how technology and an interactive pedagogy such as UDL are practiced (Tinto, 2012; Tobin, 2019), as will international students with language and cultural challenges coming into a new educational environment (Tate et al., 2014).

The literature review described in Chapter 2 resulted in fewer findings on how UDL/UDI/UID has been practiced in OHE and how this practice can contribute to a more inclusive OHE experience for learners. Researching the

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

impact of UDL/UDI/UID is significant, as learners who have been exposed to UDL/UDI/UID throughout their K–12 education will have higher expectations of their OHE learning experience and how courses are designed and delivered (Schelly et al., 2011; Smith, 2012). As North American colleges and universities have seen an increase in enrollment from international students, the UDL/UDI/UID learning design practices incorporated into online undergraduate courses may benefit learners from other countries and cultures (Chita-Tegmark et al., 2012; Kieran & Anderson, 2019; Tate et al., 2014). The concept of collaborative learning and co-creating knowledge will become more important with the rapid development of participatory digital technologies (Meyer et al., 2014; Rappolt-Schlichtmann et al., 2012; Tobin, 2018).

Collecting specific grey literature increased the volume of data, although the grey literature analyzed did not meet inclusion criteria. Strategic inclusion factors allowed a targeted amount of data to be collected and analyzed while finding answers to research questions surrounding the UDL framework and UDI/UID practices in an inclusive OHE environment.

Using inclusion criteria helped target the amount of relevant data collected and analyzed. These inclusion criteria included:

- Published and unpublished digital research artifacts (empirical findings and grey literature) from 2000 to 2020; divided into 5-year sections.
- Professional or government websites, policy papers, government publications, and professional literature written by researchers and educators.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Artifacts that include UDL as a framework and UID/UID practices in an inclusive OHE environment with connections to equitable access and digital accessibility.

This inclusion criteria limited data that were written before 2000 and after 2020; data that were not representative of good quality grey literature as noted above; and data that did not refer to UDL in an inclusive OHE. This includes articles that did not refer to UDL in online education or higher education, such as articles on professional development or K-12 education.

Definition of Terms

A glossary of terms that includes a list of technical terms or abbreviations is inserted after the table of contents. For the purposes of my research, the UDL framework and guidelines and UDI/UID practices have been described collectively as UDL/UDI/UID practices. Although the UDL framework and guidelines inform the UDI/UID learning design practices, they have been used collectively in practice (Burgstahler, 2020; Cash et al., 2021) to promote an inclusive and accessible learning environment. Describing them as collective processes simplifies the discussion throughout my study.

Summary

In Chapter 1, I described a brief history of UDL, as well as the rationale for UDL development based on legal challenges that affected how people with disabilities were able to access buildings and their lived physical environment (i.e., universal design), which led to how students with disabilities gained equitable access to education (i.e., universal design for learning). The statement

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

of problem included information on the role and development of distance education, the evolution of online distance education, and the foundation of UDL as effective learning environments and practices affect how students with disabilities and other marginalized students gain knowledge. I discussed theoretical underpinnings that describe changes to technology, Internet access, and educational approaches that influence a conceptual framework. Factors such as equity in education, an inclusive online learning ecosystem, UDL framework, UDI/UID practices, co-creation of knowledge, and the individual learner contribute to my conceptual framework. Increased enrollment of students with disabilities, students with English as an additional language, along with international students affects how educators can meet the diverse needs of a diverse population, which is a growing problem for higher education. The purpose of my study was to explore how UDL/UDI/UID learning design practices have contributed to equal access, digital accessibility, and inclusion in OHE between 2000 and 2020, as well as how they meet the diverse needs of a higher education population. My research questions followed. I concluded this chapter with a background on the decision to use a scoping review method to collect and analyze data, limitations and delimitations, the definition of terms, a summary of the chapter, and an outline of the remainder of my study.

Outline of Remainder of Study

The study is described in five chapters to portray the required elements of a valid, peer-reviewed dissertation. Chapter 2 contains a literature review that provides an overview of how this research fits within an existing research

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

landscape and elaborates on UDL/UDI/UID theory and research on equitable access, digital accessibility, and inclusion in OHE.

Chapter 3 outlines the detailed theoretical framework, research questions, research methodology, data collection and analysis, and issues related to the validity and ethics of the research approach, as well as a summary discussion.

Chapter 4 contains an analysis of data related from the research, while Chapter 5 is a detailed analysis of data related to the research questions, a presentation of the next steps for future research, and a conclusion.

Chapter 2. Review of the Literature

This chapter contains a literature review that elaborates on theory and research on equity and inclusion in an online higher education (OHE). A brief introduction is followed by an historical overview of the theory and research literature in the following areas:

Concept 1: Impact of a disability model on the individual learner

Concept 2: Equity in OHE and an inclusive OHE learning ecosystem

Concept 3: UDL framework and UDI/UID learning design practices

These cognate areas, which are relevant to the topic, provide a background of the appropriate theory and research literature that were examined in the scoping review. The literature review process, legal aspects of accessible education, and the evolution of themes gathered in the literature review and their relationship to the cognate's areas are outlined.

Chapter 2 includes a chart that explains the intersection between the conceptual framework discussed in Chapter 1 and the three concept areas that form the basis of the literature review. The relationship between the roles of learning design and technology is discussed within the context of the UDL framework and UDI/UID learning design practices. I end this chapter with an indication of how the research gained from the scoping review will contribute to the literature and practice of inclusive OHE. This literature review represents the gap in literature my research aims to fill, guides the significance of the research question, and begins to shape the conceptual framework that represents the interconnection between concepts and the research question, while the scoping

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

review (i.e., methodology) represents how the research data was collected and analyzed.

Literature Review Process

The UDL framework has been incorporated into learning design practices such as UDI and UID that seek to contribute to an inclusive OHE. Artifacts such as books, articles, websites, dissertations, policy papers, and videos about UDL in OHE were found on the AU library database catalogue. These were used to search terms related to various aspects of the research question and methodology. UDL+ Higher Education search resulted in a list of artifacts (e.g., books, articles, websites, and videos) about UDL in higher education. I reviewed 150 articles, books, policy papers, and book reviews about UDL and higher education for themes of different aspects of UDL research. Many articles were listed on closed journal sites that required membership, although several were open access journals as well. I cross-referenced other journal sites and was successful in obtaining copies of articles that were closed on some sites. I excluded articles that I was not able to access from sites that required membership. Closed sites were noted as existing sources but not included in the data analysis. Some references in this dissertation are dated, however, they are considered of historical and foundational significance in describing relevant concepts.

I checked Amazon and Kindle for books on various aspects of UDL. Contrary to my preferred method of reviewing books and articles in hard copy, I ordered as many books as I could in electronic format for two reasons. E-books

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

are lighter than books and can be located on my iPad, laptop, or iPhone, and most e-books are in an accessible format so I could experience the different ways that “reading” can take place.

Themes began to emerge from these sources related to the learner, physiology, educational philosophy, pedagogy, technology, web accessibility, learning environment, and community. These themes were distilled into the six concepts that form the basis of the study’s conceptual framework:

- equity in education
- inclusive OHE learning ecosystem
- UDL framework
- UDI/UID practices
- knowledge creation
- individual learner

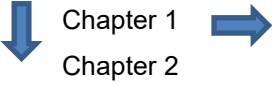
The six theoretical concepts, as outlined in detail in Chapter 1, were incorporated into three themes. How the conceptual framework connects to the three concepts discussed in Chapter 2 is demonstrated in Figure 3, which consists of four rows and seven columns. The first descriptor on the top left corner of the figure is titled Literature Review Concepts. This connects the three literature review concepts along the top row with a descriptor in the left-hand column that depicts the six theoretical concepts and how these intersect with the three concepts listed as the column headings. Figure 3 has been prepared so a screen reader can describe the connection.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Figure 3

Intersection of Conceptual Framework (Chapter 1) and Literature Review

(Chapter 2)

Literature Review Concepts 	Impact of Disability Model on the Individual Learner	Equity in OHE and an Inclusive OHE Learning Ecosystem	UDL Framework and UDI/UID Learning Design Practices
Equity in Education (Critical pedagogy, pragmatism)	√ Supports learner	√ Supports learner	√ Supports learner
Inclusive OHE Learning Ecosystem (Institutions, policies, technology, web accessibility, pedagogy, physiology, teachers, learners, and community)	√ Supports learner	√ Supports learner	√ Supports learner
UDL Framework supported by neural networks for learning: Affective Recognition Strategic	√ Supports learner	√ Supports learner	√ Supports learner
UDI/UID Practices Instructional design	√ Supports learner	√ Supports learner	√ Supports learner
Knowledge Creation (educator, learner, content, system)	√ Supports learner	√ Supports learner	√ Supports learner
Individual Learner (supported by all of the above)	√ Supports learner	√ Supports learner	√ Supports learner

Note: I created Figure 3 to illustrate the intersection between six conceptual framework concepts and three cognate area concepts derived from the Chapter 2 literature review. The check mark symbols denote how each area of the conceptual framework is designed to support the learner.

Interconnection between Concepts

The following three themes reflect the research in my dissertation's literature review of the six conceptual concepts described above and illustrated in Figure 3. The three thematic concepts being described are: (a) the impact of the disability model on the individual learner, (b) equity in OHE and an inclusive OHE learning ecosystem, and (c) the UDL framework and UDI/UID learning design practices.

Concept 1: Impact of Disability Model on the Individual Learner

There is a connection between social justice concepts of distance education to critical pedagogies that encourage students and educators to question and challenge the beliefs and practices of power in a dominant society (Dron, 2018). Achieving equal access is situated in what this means. How access to education is understood affects actions and behaviours within a society and how it is practiced within a particular society. School systems are based on the needs of learners in a dominant society, where learners are required to adjust to the teaching methods of a particular environment (Dron, 2018; Peters & Bradbard, 2010). The onus is on the student with disabilities, or the student with atypical needs, to adjust to a typical learning environment.

Most institutions have robust student support services and student associations. This is an integrated technique I have experienced at AU, my home institution, as an educator, representative on the Faculty of Humanities and Social Sciences Faculty Council, as a subject matter expert on an open-source health communication course, and as a graduate student in the AU doctoral

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

program in distance education (EdD). This is an integrated approach consistent with an inclusive OHE learning environment, which is one of the key aspects of the conceptual framework of my research.

Accessibility features incorporated into course learning design include features such as screen readers for visually impaired users, which translate text and graphics to an audio format to hear screen content, or the use of transcripts or text for hearing impaired users to read audio or video files (Peters & Bradbard, 2010). Peters and Bradbard (2010) noted that W3C standards advocate for web accessibility in four domains: social, technical, legal/public policy, and financial. As scholars working in the College of Business Administration at Winthrop University, their discussion of web accessibility is from a business and educational perspective regarding consumers with disabilities, advocating the social benefits of supporting equal or equitable web accessibility to all potential computer users.

Some keys practices of accessible design for websites include alternative text, logical document structure, data table headers, online form completion, readable weblinks, caption/transcripts for media, content accessibility for all formats, skip repetition, cautionary colour coding, clearly written and easy-to-read content, and accessible JavaScript (WebAim, 2020). As stated in Chapter 1, I used UDL and web accessibility practices in the writing and presentation of this dissertation.

Web accessibility is only one component of equitable access to education for persons with disabilities (Burgstahler, 2020). The response to providing

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

equitable access has shifted from a focus on the individual's physical or mental disability as a barrier to learning, which was solely based on a medical model, to a focus on how the learning environment limits individuals with physical or mental impairments to access online education (i.e., a social model). Understanding how the concept of disability has evolved alters the conversation on equitable access for the individual learner.

The medical model of disability suggests disability rests on the individual's physical or mental impairment because of disease or trauma, putting the focus on the individual to adapt to their surroundings (People with Disability Australia, 2023; Seale 2014). The social model of disability considers the environment or surroundings of the individual's physical or mental impairment as a barrier to the individual's ability to perform daily living activities (Seale, 2014, p. 12). This puts the onus on segments of society to adjust the environment to allow equitable access to daily living activities that may include online learning. This shift from the individual to the environment is commonly known as "curb cuts" in universal design (Rao & Tanners, 2011; see also Seale, 2014). Physical adaptations such as wheelchair ramps, elevators, and wide corridors and doors at the institutional level allow equitable physical access for learners. Technological adaptations to web services such as web accessibility benefit visually, hearing, or learning impaired staff and learners in a learning institution (Seale, 2014), in the way pedagogical adaptations such as UDL, UDI, or UID benefit students with disabilities and all learners in an online environment (Burgstahler, 2020; Pliner & Johnson, 2004).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

The conversation about web accessibility is about offering an inclusive OHE to students with disabilities that benefits an increasingly diverse higher education population (Aquino, 2016; Burns, 2020; Haug, 2017). Recognition of how equity and inclusive education based on changing societal values have shifted from a focus on students with disabilities to students from diverse racial, ethnic, gender, and sexually diverse backgrounds (Aquino, 2016; Haug, 2017). This recognition and understanding affect how an inclusive education is researched and delivered. The inclusive OHE should reflect and support how all learners learn.

All segments of populations are essential to society. This perspective needs to be reflected in an inclusive learning ecosystem that includes institutional policies and support for technology, web accessibility, and pedagogy; developing expert learners to increase student success (Kim & Aquino, 2017; Meyer et al., 2014); along with communities of practice (Farnsworth et al., 2016; Wenger et al., 2002) within institutions to help build learning communities between all staff involved in student success. Within the discussion on communities is the notion of co-creating knowledge, by educational reformers John Dewey (1933) and Paulo Freire (1970).

Freire (1970) pioneered the concept of critical consciousness (p. 62) with illiterate Brazilian field workers, who were among an oppressed society in Brazil. He rejected the notion of the “banking method” of education (p. 62), where educators (the oppressors) deposit information into the minds of students (the oppressed) as passive receptacles as opposed to his problem-solving method of

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

education where educators present and critically discuss information with students, which helps co-create knowledge with educators. Freire considered this “cognitive” or conscious intent to dialogue between students and the educator as a community of critical co-investigators in learning (p. 68). The educator describes material for discussion with students and reconsiders his earlier position as the students express their own ideas. This involves dialogue, reflection, and a balance of power. Freire patterned his educational philosophy on Dewey’s (1933) similar beliefs about the relationship of both educator and student playing an active role in learning and expressing ideas, especially in dialogue and self-reflection.

An addition to this concept is Scheer et al.’s (2012) emphasis on constructivist learning and design thinking that discusses the interactive relationship between learner and their own observations. The authors noted constructivism immerses the learner in the context and environment. Scheer et al. pointed to Dewey’s regard for the complexity of gaining knowledge through an interaction between the learner and their environment. The authors noted that Dewey understood “learning as a multifaceted process of structured interaction of humans with their natural and social environments” (p. 9). This is consistent with knowledge creation as outlined in my research’s conceptual framework of Dewey’s (1933) philosophy of education and Freire’s (1970) critical pedagogical approach to co-creating knowledge (Maboloc, 2021; Scheer et al., 2012). Maboloc (2021) considered Dewey and Freire’s approaches complementary but difficult to achieve within an education system that compartmentalizes learning

into achievable sections of learning that do not benefit the learner's ability to think critically and constructively.

These educational philosophies restore the balance of power in the classroom and promote democratic and equitable approaches to education. This orientation is discussed in the following section on equity in OHE education and an inclusive OHE learning ecosystem.

Concept 2: Equity in OHE and an Inclusive OHE Learning Ecosystem

How equitable or accessible open and distance learning (ODL) and inclusive OHE are not clearly stated in the literature, although there were references to learning design frameworks such as UDL and learning design practices such as UDI/UID, based on the concept of universal design (UD).

Legal Aspects of Accessible Education for Equity. There are legal aspects of equity that are important to the discussion examining UDL/UDI/UID practices on equitable access to an inclusive OHE.

As discussed in Chapter 1, there are national and international laws governing the rights of persons with disabilities to an accessible education. In Canada, the *Canadian Charter of Rights and Freedoms*, Section 15(1), which is contained in the *Constitution Act of Canada* of 1982 refers to the rights of persons with disabilities. In the US, the *Americans with Disabilities Act* of 1990, *Individuals with Disabilities Education Act* of 1997, and subsequent revisions are laws developed to protect persons with disabilities. Laws protecting the rights of persons with disabilities vary between the US and Canada, and between states and provinces. Internationally, the rights of persons with disabilities are

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

articulated in the *Convention on the Rights of Persons with Disabilities, Article 9* (UN Department of Economic and Social Affairs Disability, 2006). This literature review only examined the American and Canadian contexts, as most research artifacts concerned North America. More research has been conducted outside North America since UDL was developed in 1998. However, other countries were included in the scoping review data collected and analyzed for my research. The discussion on legal challenges relates to the necessity for researching how UDL contributes to an inclusive OHE, along with equitable access and digital accessibility.

As noted in Chapter 1, UDL began as a response to legal challenges in the US around the *Individuals with Disabilities Education Act (IDEA)* of 1997 (as cited in Edyburn, 2010, p. 33). An increased interest in inclusive education and development of UDL eventually evolved into a definition of “universal design” and “universal design for learning,” which was written into law in the 2004 IDEA Act and subsequently in the 2008 Higher Education Opportunity Act (Edyburn, 2010, p. 34).

In Canada, persons with disabilities, along with other individuals, are protected under the *Canadian Charter of Rights and Freedoms* (1982, Part I, Section 15(1), para. 1 and 2), which states:

Equality before and under law and equal protection and benefit of law

15(1). Every individual is equal before and under the law and has the right to the equal protection and equal benefit of the law without discrimination

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

and, in particular, without discrimination based on race, national or ethnic origin, colour, religion, sex, age or mental or physical disability.

Affirmative action programs

(2) Subsection (1) does not preclude any law, program or activity that has as its object the amelioration of conditions of disadvantaged individuals or groups including those that are disadvantaged because of race, national or ethnic origin, colour, religion, sex, age or mental or physical disability.

Although education is not mentioned specifically, this section of the Charter means “governments must not discriminate on any of these grounds in its laws and programs” (para. 3). This section has been held by the courts to “prohibit discrimination on the grounds of sexual orientation, marital status, or citizenship” (para. 4), and other characteristics not specifically set out in the Charter.

Protection for persons with disabilities is also secured under Canadian and provincial/territorial human rights law.

According to Lau et al. (2020), accessibility standards were established provincially, in Ontario in 2005 with the *Accessibility for Ontarians with Disabilities Act* (AODA), in Manitoba in 2013, with the *Accessibility for Manitobans Act* (AMA) and in Nova Scotia in 2017 with the *Accessibility Act*. National legislation was established in 2019 with the *Accessibility Standards Act* (ASA) designed to enable all persons to participate fully in a barrier-free society. Lau et al. pointed out that accessibility standard legislation varies across provinces and municipalities, although they must meet the standards set out in

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

the ASA. The ASA is a national standard that supersedes provincial legislation if provincial standards do not meet the minimum national standards.

Canadian scholars Treviranus et al. (2010) discussed the need to expand accessibility in the Information Communication Technology (ICT) industry to “ensure the growing population with disabilities is not excluded from the digital economy” (p. 5). They attributed a greater incidence of disability to aging; noting that between 2015 and 2021, there will be more seniors than children 14 and older. Improved health care systems increase survival rates from various injuries and illnesses, leading to a higher population of people with disabilities, and “natural and manmade disasters, violence or conflict” (p. 6) add to this increased population with disabilities. Treviranus et al. also noted the increase “in our reliance on ICT based transactions” (p. 5) and the necessity to improve technological accessibility so that those with disabilities are not excluded from daily living functions that are increasingly available online.

It is significant that the Treviranus et al.’s (2010) article emerged from the search on “Higher Education” as UDL was not mentioned specifically in this article. Treviranus et al. made a reference to accessibility that discussed universal design (UD) practices without naming UD specifically. In subsequent searches on these scholars, several articles and conference proceedings from Canadian scholars Fichten, Asuncion, Thomson, and others from three key Canadian institutions (Dawson College, McGill University, and Adaptech Research Network) emerged as key contributors to research on accessibility,

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

inclusiveness, and UD in Canada (King et al., 2017; National Educational Association of Disabled Students, 2006a, 2006b; Thomson et al., 2015, 2017).

There appears to be a distributed network of scholars and practitioners of research on students with disabilities in Canada with a narrative that focuses on accessibility, assistive technology, and ICTs. Research papers on accessibility practice discuss the pedagogical approach of UD, without specifically identifying UDL, UDI, or UDI, with a focus on assistive technology and ICTs (King et al., 2017; Thomson et al., 2015, 2017). American scholars and practitioners such as Burgstahler, Hall, Johnston, Meyer, Novak, and Rose, who are connected through CAST and the National Center for Universal Design for Learning, focus on the pedagogical approach of UDL, UDI, or UDI with technology incorporated into the pedagogy (CAST, n.d.-b; National Center for Universal Design for Learning [NCUDL], 2021). McGill University is the one Canadian university mentioned on the UDL on Campus site (CAST, n.d.-e), that describes a system-wide implementation and audit of their UDL institutional design and approach (Beck et al., 2014; CAST, n.d.-d). In Canada, the Canadian Higher Education UDL Collective, is a group of post-secondary educators from across Canada, located at Mohawk College that research and promote UDL learning design practices.

Treviranus et al. (2010) discussed the important role assistive technology (AT) plays in enabling computer access for individuals with physical, cognitive, and sensory disabilities. There are many challenges in designing AT systems so that software and hardware are compatible with various computer systems

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

including (a) the proprietary nature of ICT product development; (b) the necessity to upgrade AT with each change in software application; and (c) increased cost to design AT and try to maintain its “functionality, reliability and availability” (p. 8).

WebAIM (2020) described a major means of providing web page access to all persons with disabilities that meet Web Content Accessibility Guidelines (WCAG), an international set of guidelines for web accessibility developed by the Worldwide Web Consortium (W3C). WCAG is based on the principles that web content be perceivable, operable, understandable, and robust (WebAIM, 2020, Laws and Standards section). As with other accessible design features, these considerations benefit people with visual, hearing, motor, and cognitive impairments, as well as other users, making it easier to navigate websites.

Web accessibility is a major aspect of access to information for all users, especially educational institutions that provide distance education. WAVE, or the website accessibility evaluation tool, is located on the WebAIM (n.d.) website. WAVE tests websites for accessibility by simply inputting the web address of a site that you wish to evaluate. Peters and Bradbard (2010) suggested WCAG is engrained in web development culture; however, not all institutions or agencies have the resources to develop websites that are completely web accessible.

There are ethical challenges when web development culture is not integrated into institutional culture to support equitable web accessibility, especially in online learning environments (Peters & Bradbard, 2010). Evaluating the research on web accessibility contributes to an understanding of barriers to

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

online learning for individuals and how educational institutions comply with WCAG guidelines to overcome these barriers.

My review of literature grounding my study indicated concepts, such as the impact of the disability model on the individual learner, equity in OHE and an inclusive OHE learning ecosystem, and the UDL framework and UDI/UID learning design practices, are often discussed as separate entities, making it difficult to determine how the *philosophy, pedagogy, and technology* work together to benefit all students. Roberts et al. (2011) used UDI and related terms such as UDL, UID, and UD, and postsecondary, college, university, and higher education settings (p. 7) to examine the use of UDI, UDL, UID, and UD in post-secondary environments. Roberts et al. noted a disconnect between UDI/UID interventions and discussions on elements of technology as a critical tool in increasing accessibility to students with disabilities and an increasingly diverse student population.

Al-Azawei et al. (2016) were specific in researching the potential for the UDL framework to create equal learning opportunities for all learners, both online and offline, and included secondary school students, undergraduate students, and educator candidates. Their research examined UDL-based instructional design to reduce barriers between learners with and without impairments and reduce the need for a design retrofit for special student accommodations. Al-Azawei et al. suggests UDL is an effective approach to designing flexible and accessible learning environments that may be used to benefit a wide range of learners. It is important to consider that digital learning is crucial to higher

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

education institutions in order to have accessible online learning environments for students. In his policy brief, Bates (2021) noted that having access to technology for all learners (bandwidth and computers/tablets) is necessary, along with incorporating UDL practices to meet the needs of students with disabilities, especially. Bates mentioned this in relation to the COVID-19 pandemic that shifted higher education learning to an online format.

The definition of inclusive education has shifted from working with students with disabilities to working with students with racial, ethnic, gender, and sexually diverse backgrounds (Aquino, 2016; Haug, 2017). Haug (2017) noted inclusive education emerged in the 1960s in response to integration of students with disabilities into the classroom and more emphasis on the social model of disability to consider the *learning environment* as a barrier to learning, not the student. There is concern about how much institutional focus is being attached to students with disabilities, as inconsistencies exist in how inclusive education is practiced in North America and Europe. Some scholars are concerned the increased focus on cultural diversity may limit how students with disabilities are viewed in the classroom and in institutional policy that does not provide appropriate funding and commitment (Aquino, 2016; Haug, 2017).

The goal of an inclusive education is to remove barriers to learning for all students. This reinforces how the concepts of UDL, UDI, and UID are researched and practiced, as its focus is to design learning to the variability that exists in how humans learn (Meyer et al., 2014; Yuan et al., 2017). Designing for a combination of UDL in curriculum design and culturally responsive teaching

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

(CRT) promotes language that is inclusive and respectful, and not gender-limiting, along with using diverse academic content and intentional mixing of groups to generate understanding of diverse backgrounds and civil discourse (Kieran & Anderson, 2019; University of Delaware, 2016). CRT principles enhance practices and promote equity for all students. This evolution is also evident in the goals of UDL, which have shifted to developing an expert learning system that shifts from the individual learner as the problem in learning to an environment that needs to adjust to the systematic variability in all learners, including cultural variability (Chita-Tegmark et al., 2012; Meyer et al., 2014). According to Meyer et al. (2014), the design of expert learning involves development of a system with learner-centred curricula, with educators prepared to collaborate with students to learn and an institution that fosters community and collaboration to maximize learning opportunities (p. 23).

Community-centred learning environments contribute to learner success as places that contribute to “norms for people learning from one another and continually attempting to improve” (National Research Council, 2000, p. 156). The classroom, school, students (peer-learning), educators as practitioners, parents as mentors, and administrators as policymakers are all communities where learning takes place. The National Research Council (2000) posited a connection between these communities “to the larger community of homes, businesses, states, the nation, and even the world” (p. 157), and has encouraged learner-centred, knowledge-centred, assessment-centred, and community-centred learning environments.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Faculty and administrators play a pivotal role in trying to implement UDL practices in HE institutions. There is a “chicken-and-egg” dynamic in implementing UDL: Policymakers like to make evidence-based decisions on educational policy, administrators seek policies and budget considerations to implement new practices, and faculty may not have the ability to vary from curriculum to include new practices. Each of these groups is a community that could influence changes to educational policies and practices. UDL has been practiced for over 20 years, with a body of knowledge in UDL theory, practice, and assessment that moves educators closer to wide-scale implementation of an inclusive OHE. Evaluating the impact of community, especially communities of practice in various forms, on UDL policy and practice, technology, pedagogy, and assessment will contribute to understanding practices that have worked in these areas.

Concept 3: UDL Framework and UDI/UID Learning Design Practices

UDL has been described as a theoretical approach to guide learning that is flexible and supportive of all learners (Hall et al., 2003; Meyer et al., 2014; Yuan et al., 2017), although the framework was originally designed to support students with disabilities (CAST, n.d.-a; NCUDL, 2021; Novak & Thibodeau, 2016). Numerous factors create opportunities to support these learners. Technology has increased the reach of distance education—opening the door for people to learn and earn a certificate, diploma, or degree (almost) anywhere they live—outside of a traditional, full-time, in-class learning experience. As noted by Scheer (2012), pedagogy contributes to the quality of learning through examining

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

how practitioners have built on the theories of Dewey and Freire. An understanding of human physiology, policies, and practices that promote accessibility coupled with a community of learners to practice and assess UDL work together to create a learning environment to meet the needs of many learners (Burgstahler, 2020; Hall et al., 2012; Jimenez et al., 2007; Meyer et al., 2014).

UDL was based on the concept of three primary brain networks involved in learning based on atypical differences in individuals. The three brain networks are: (a) the Affective Network: the WHY of learning; (b) the Recognition Network: the WHAT of learning; and (c) the Strategic Network: the HOW of learning. These three principles of UDL fit within each of these networks: (a) Affective, which includes multiple means of engagement; (b) Recognition, which includes multiple means of representation; and (c) Strategic, which includes multiple means of action and expression (CAST, n.d.-a; NCUDL, 2021; Novak & Thibodeau, 2016).

According to Meyer et al. (2014), the three UDL principles work together to create *expert learners*, while pedagogical approaches created by *expert teachers as expert learners* contribute to an *expert learning system* through an intentionally created learning ecosystem that includes educational philosophy, community of learners and educators, institutional infrastructure and policies, and a technological social network. Their definition of an expert learner does not suggest mastery of a specific topic. Rather, it suggests a continuum of development that is contextual and different for every person. In a learning

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

organization, every person can become an expert learner, where “the goal of developing expertise is shared by all participants: students, teachers, and all the personnel in the system itself “(Meyer et al., 2014, p. 22).

Meyer et al. (2014) suggested qualities such as “the practice, the reflection, the self-efficacy, the self-regulation, the self-determination, the executive functioning, the comprehension, and the situational awareness” (p. 22) contribute to a learning mindset shared by expert learners. These educators attribute a growth mindset to learners who “perceive challenges as opportunities to expand their knowledge and ability” (p. 31). Learners with a growth mindset meet failure at a task with increased “effort and persistence” (p. 31). Similar ideas are shared by educational equity advocate, Tinto (2012), in research on first-year student success in higher education in what he termed effective classrooms: “Clear expectations, timely support, feedback on assessment, engaging pedagogies and enhancing teaching skills” are universal concepts that could be used to transform classrooms (p. 1).

Tinto (2017) described encouraging key dimensions of student motivation and persistence, like “student self-efficacy, sense of belonging, perceived value of the curriculum” (p. 2), as creating a learning environment that supports student retention and success, especially with underserved first-year HE students. Tinto discussed effective classrooms from an F2F perspective, recognizing the role that technology plays in enabling an engaging, social classroom. Dron and Anderson (2008) noted similar insights on the benefits of social e-learning practices, such as “wikis, collaborative tagging, and to a certain extent, blogging

learners can play a significant role in the generation of a knowledge structure” (p. 2) that enable students to control or choose how they learn within a learner-centred pedagogical classroom experience. Education reformer Freire (1970) introduced the concept of student control and dialogue and promoted a critical approach to learning as a dialogue between students and educators in co-creating knowledge, while fellow education reformer Dewey (1933) noted the influence of practice and reflective habits as part of a collaborative approach to learning.

The Role of UDL in Learning Design

These pedagogical approaches are consistent with UDL/UDI/UID learning design practices, as they offer multiple means of engagement, representation, and action and expression. The UDL framework has been used to develop expert learners by tapping into the affective, recognition, and strategic neurological networks in humans (CAST, n.d.-a; Meyer et al., 2014).

There are several UDL/UDI/UID scholars and practitioners who have elevated the concept of UD and the UDL framework into practice to demonstrate what can work to remove barriers to learning for all (Burgstahler et al., 2020; Edyburn, 2010; Hall et al., 2012; Hall et al., 2003; Meyer et al., 2014; Novak, 2016; Pliner & Johnson, 2004; Tobin, 2014). As posited by Al-Azawei et al. (2016) and Roberts et al. (2011), there has been little academic research on how the UDL/UDI/UID practices work. Web accessibility plays a huge role in practice from an institutional perspective (Peters & Bradbard, 2010; Repasky, 2023) and a practical perspective, as web-accessible mobile devices allow students to

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

transcend time, place, and space in their learning journey (Tobin, 2014, 2018, 2019). These scholars and practitioners emphasized the importance of good learning design strategies.

The UDL guidelines (CAST, 2018b) are updated through research and practice, including a newly announced community-driven process to become more inclusive through the UDL Rising to Equity initiative (CAST, 2018a). Pedagogy plays a critical role in contributing to equitable access to an inclusive OHE (Shi, 2020). Rao and Tanners (2011) referred to UDL as one of three educational models adapted to curriculum and instruction, which they identified as Universal Instructional Design (UID), Universal Design for Learning (UDL), and Universal Design of Instruction (UDI). Rao and Tanners designed and implemented a graduate-level online course using UDL and UID, where students were surveyed both pre-and post-instruction to assess the features that students valued. UD features that students valued were (a) providing options and choices, (b) the instructional strategies, and (c) interactions. These educational models are described in detail in Table 2, where they are presented from left to right with two columns called Educational Models and Main Principles or Guidelines. The three rows beneath each column heading are a corresponding list of principles and guidelines in a corresponding column for each educational model. Rao and Tanners (2011) concluded that the objectives of the course need to be considered, along with the strategies and technological tools to meet those objectives when designing a course.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Meyer et al. (2014) described curricula as having four instructional components: (a) goals, (b) assessment, (c) methods, and (d) materials (p. 14). Although Meyer et al. discussed UDL in terms of K-12 instruction, these same components are reflected in Rao and Tanners's (2011) study on UDL and UDI learning design principles. The educational models in Table 2 describe UDL, UDI, and UID. Meyer et al. noted that feedback in the form of formative assessment throughout the course helps the educator gauge student understanding and performance so that adjustments can be made, if necessary. This is consistent with Tinto's (2012) discussion on universal concepts such as setting expectations, timely feedback on assessments, and engaging pedagogies.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table 2

Universal Design Educational Models

Educational Model	Main Principles or Guidelines
UID: Universal Instructional Design*	<ul style="list-style-type: none"> 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**	<p>Principle I: Provide Multiple Means of Representation</p> <p>Principle II. Provide Multiple Means of Action and Expression</p> <p>Principle III: Provide Multiple Means of Engagement</p>
UDI: Universal Design of Instruction***	<ul style="list-style-type: none"> 1. Class climate 2. Interaction 3. Physical environments and products 4. Delivery methods 5. Information resources and technology 6. Feedback 7. Assessment 8. Accommodation

Note: Adapted from Rao and Tanners (2011). Their descriptions were based on:

* UID (Goff & Higbee, 2008, as cited in Rao & Tanners, 2011, p. 212);

** UDL (National Centre on Universal Design for Learning, 2010, as cited in Rao & Tanners, 2011, p. 212); and

*** UDI (Burgstahler, 2009, as cited in Rao & Tanners, 2011, p. 212)

The Role of Technology

Technology has increased the capacity for learning in classrooms and online environments (Dron, 2018; Haug, 2017; Peters & Bradbard, 2010). Technological advancements such as personal computers, digital media, multimedia, and networking allow content to be displayed in many formats such as text, sound, and images. They allow the learner choice in how they “view” the content and enhance the capacity to search the Internet for more information or use hyperlinks to gather additional information on other sites (Hall et al, 2012, p. 532). Text-to-speech helps learners with hearing impairments and learning disabilities, while the use of graphics to organize concepts helps learners remember information and apply what they learn (p. 532).

Cradler et al. (2002, p. 47) noted that research and evaluation findings confirm the influence of technology on student achievement and performance in three primary curricular goals: (a) achievement in content area learning, (b) higher-order thinking and problem-solving development, and (c) workforce preparation. Cradler et al. described several studies where content-area learning and select technology have increased student performance. They described technology tools that support higher-order thinking as students construct artifacts, apply the tools and problem-solving processes to solve problems, or use technology to “convert data into information and transform information into knowledge” (p. 48). Cradler et al. added that the role of the educator in this process is essential to guide students’ higher-order thinking skills during learning

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

activities using technology tools; otherwise, students may miss applying sound conceptual thinking.

Assistive technology is becoming mainstream due to the types of technology included on smartphones, computers, or tablets, which learners can use to access information (O'Sullivan, 2016). O'Sullivan noted that operating systems on computers and tablets include free assistive technology like word prediction, text-to-speech, and speech-to-text. O'Sullivan (2016) predicted that most assistive technology, which he calls UDL Technology, will become mainstream and blur the lines between people with or without physical or mental impairments (p. 163). He considered the term UDL Technology an effective marketing tool to students as it removes the stigma of using assistive technology, especially in promoting the use of voice, art, music, and video apps to educators in engaging students of all abilities (O'Sullivan, 2018).

O'Sullivan (2018), a librarian and assistive technology specialist, self-published his 2016 eBook, while expanding his knowledge and experience with assistive technology as a writer and speaker. O'Sullivan's (2016) book includes discussion on a wide range of technology-related topics such as: file transfer, interactive whiteboards, project with a tablet, instant student feedback, video editing, sound recording and editing, research, cyber-bullying, music synthesizers and software, specific strategies for math, science, literature, language learning, writing, fine arts, and specific assistive technology. These techniques are consistent with information retrieval and social network

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

techniques discussed by Dron and Anderson (2008) that have also enabled student choice and control in learning.

Summary

Altogether, the literature review on the impact of the disability model on the individual learner, equity in OHE and an inclusive OHE learning ecosystem, and UDL framework and UDI/UID learning design practices present the interconnection between concepts that form the basis of my conceptual framework. Original concepts from the literature review emerged, such as the learner, physiology, educational philosophy, pedagogy, technology, web accessibility, learning environment, and community. These corresponded with themes from Meyers et al. (2014) that were distilled into the three concepts examined in this literature review, then expanded into six topics that form the basis of my research's conceptual framework.

Research on accessibility, inclusive education, UDL framework and UDI/UID learning design practices began with creating a better learning environment for students with disabilities. There were legal and ethical challenges that led to an emphasis on improving learning for students with disabilities (Edyburn, 2010; Lau et al., 2020). The role of UDL and the role of technology were discussed in relation to creating equitable learning environments for students. The understanding of UDL/UDI/UID learning design research and practices that focused on individual differences has changed to recognition of a variability in learning that exists across all populations. This shifts responsibility for creating accessible learning environments away from students

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

and becomes the responsibility of the institution (Al-Azawei et al., 2016; Edyburn, 2010; Meyer et al., 2014; Parsky, 2023; Peters & Bradbard, 2010; Rao & Tanners, 2011; Roberts et al., 2011).

This dissertation research will help inform HE educators and educational institutions about UDL/UDI/UID best practices that have evolved since 1998 (CAST, n.d.-c) to respond to legislation governing the educational needs of students with disabilities and an increasing number of students from diverse backgrounds. The best practices identified in the findings create more inclusive online learning environments that respond to the atypical needs of all students and contribute to students' success in the OHE classroom. This is necessary to enhance an inclusive OHE by providing instructional design practices to promote equitable access and digital accessibility to students with disabilities, and all learners.

Elaborated in Chapter 3 is the theoretical framework of my research; my positionality as a researcher; and a brief discussion on the paradigmatic, epistemological, ontological, and axiological assumptions that underpin my research philosophy. The methodology for the study is also described, which includes data collection and analysis of the results of a scoping review of both academic and grey literature, along with the axiology or ethics connected to my research. I elaborate on how the scoping review method is adapted to answer the research questions posed in Chapter 1, using both peer-reviewed and non-peer-reviewed research artifacts, along with an *a priori* protocol to maintain validity of the evidence examined in the study.

Chapter 3. Theoretical Framework and Methodology

The literature review in Chapter 2 synthesized numerous results of my study that form the basis of a conceptual framework that examines how the UDL framework and UDI/UID learning design practices have been researched and practiced in an inclusive OHE learning environment. Provided in this chapter is an overview of the theoretical framework and my theoretical positionality as a researcher, discussing related paradigmatic, epistemological, ontological, and axiological assumptions. The methodology description that follows includes how the data collection and analysis of the scoping review using both academic and grey literature was undertaken, along with the ethical considerations connected to my research.

Theoretical Framework

According to Grant and Osanloo (2014), articulating a theoretical framework is the foundation of a dissertation, as theory provides a blueprint or “structure to philosophically, epistemologically, methodologically, and analytically approach of the dissertation as a whole” (p. 13). Koro-Ljungber et al. (2009) discussed the importance of epistemological awareness and understanding of methods in qualitative methodology, decision-making, and reporting, especially the value of a logical, open statement that situates the researcher’s theoretical perspective for the reader. The epistemology or how knowledge is understood as a building block is how research is conducted. This includes understanding the nature of the researcher’s philosophy or worldview (i.e., paradigm), the nature of knowledge (i.e., epistemology), the nature of reality (i.e., ontology), and how the

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

axiology (i.e., ethics) work together to create a theoretical framework to find solutions to real-world problems (Grant & Osanloo, 2014; Kivunja & Kuyini, 2017; Koro-Ljungber et al., 2009). Discussions follow that bolster and influence the research methodology described later in this chapter.

Overview of Theoretical Framework

Research terminology can be complex and confusing, depending on the context of the situation. Kivunja and Kuyini (2017) suggested there is still controversy on how a paradigm is understood in different fields, settling on Morgan's (2007) thoughts that a paradigm has been understood as a worldview, an epistemological approach, a shared belief among members in a field of study, and a model of research.

Johnson and Onwuegbuzie (2015) discussed the assumptions of two research paradigms that were once considered the subject of *paradigm wars* by purists of either quantitative (i.e., positivist) or qualitative (i.e., interpretivist) research. Johnson and Onwuegbuzie argued quantitative researchers promote strict social science observations and knowledge rooted in a neutral reality from scientific data devoid of emotional detachment from subjects and an impersonal passive writing style in examining educational research. Conversely, they argued qualitative researchers embrace multiple-constructed realities that are contextual, value-bound, and not consistent with findings that demonstrate cause and effect, while adopting a rich, detailed, and more informal writing style. They argued mixed-methods research is a pragmatic and balanced approach from the most relevant quantitative and qualitative approaches, suggesting this is more

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

conducive to an increasingly interdisciplinary and dynamic society, where multiple methods can promote better communication and collaboration among scholars, resulting in superior research.

Researchers Kivunja and Kuyini (2017) have a broader definition of a research paradigm as a philosophical way of thinking that includes the epistemology (i.e., knowledge), the ontology (i.e., nature of being/existence), the methodology (i.e., research design, collection, and analysis), and the axiology (i.e., ethics) of research. Each of these elements contributes to a researcher's perspective or beliefs and principles that form a conceptual lens to shape how a researcher sees, interprets, and acts within their world, and each influences how the researcher may determine the research methods used and analyzed. Kivunja and Kuyini (2017) discussed four research paradigms that have emerged over time: (a) positivist, (b) interpretative/constructivist, (c) critical/transformational, and (d) pragmatic. To alleviate some confusion on research paradigms, I compiled Table 3 from research conducted by Kivunja and Kuyini (2017) in articulating research paradigms and the epistemological, ontological, methodological, and axiological elements that contribute to this scoping review. Table 3 is comprised of five columns presented from left to right that describe research terminology: paradigm, epistemology, ontology, methodology, and axiology. The four rows below each column heading are aspects of four paradigms: (a) positivist, (b) interpretivist/constructivist, (c) critical/transformational, and (d) pragmatic. Each row's description corresponds with the column headings.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table 3

Discussion on Understanding Research Paradigms

Paradigm (Philosophy)	Epistemology	Ontology	Methodology	Axiology
<p><i>Positivist</i> – scientific method, cause and effect, verifiable empirical data</p> <p>Determinism, empiricism, parsimony, generalizability (pp. 30–31)</p>	<p><i>Objectivist</i> <i>Role of Researcher: Observer</i></p>	<p><i>Naïve Realism</i> (p. 31) Reality derived from the material world</p>	<p><i>Experimental (Quantitative)</i> Context is not important. Results can be quantified Objective search for facts</p>	<p><i>Beneficence</i> (good outcomes for a research project, humanity, and participants)</p>
<p><i>Interpretivist/ Constructivist-</i> Interpretivist paradigm understands knowledge as a subjective view of human experience. Reality is socially constructed; theory is grounded in data that emerge from research. (pp. 33–34)</p>	<p><i>Subjectivist</i> (researcher makes meaning through their own cognitive processes interacting with participants) Role of researcher: Participant Observer</p>	<p><i>Relativist</i> (p. 33) Data have multiple realities constructed through researcher, subject, and participants</p>	<p><i>Naturalistic</i> Context matters. Data are gathered through interviews, discourse, reflection.</p>	<p><i>Balanced</i> Data reflect researcher values</p>
<p><i>Critical/Transformative:</i> Situates research in social justice; addressing political, social, and economic issues that lead to oppression (p.35-36). Attempts to transform the world for the oppressed.</p>	<p><i>Transactional:</i> Researcher interacts with participants Role of researcher: Transactional</p>	<p><i>Historical Realism:</i> Social and historical significance</p>	<p><i>Dialogic Qualitative:</i> (emphasizes praxis, action and participatory research)</p>	<p><i>Cultural Norms:</i> Works with participants to minimize power relationships</p>
<p><i>Pragmatic</i> Seeks most practical research method to study phenomenon (p.35-36) – not one best method – best method for situation studied</p>	<p><i>Relational Observer and/or Participant</i> Role of researcher: Dependent on researcher’s view of problem/study</p>	<p><i>Non-Singular Reality</i> No single reality</p>	<p><i>Mixed Methods</i> (Combination of Quantitative /Qualitative)</p>	<p><i>Value-Laden:</i> benefits people</p>

Note: Compiled from Kivunja and Kuyini (2017).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

The purpose of this adaptation is to illustrate a balanced approach in my theoretical framework as a researcher for my research. Research practices have evolved over time in Western society and may be practiced differently in other cultures. Other cultures may demonstrate their research practice more collectively with their own ethical and accountability measures, such as the First Nations Principles of Ownership, Control, Access, and Possession (OCAP) and research principles in an Indigenous context: Ethics, Respect, Fairness, Reciprocity, Collaboration, and Culture (University of British Columbia, 2021).

My Theoretical Positionality

A brief discussion on my theoretical positionality that describes the overall philosophy of my research choice is presented next.

Paradigm

Just as Johnson and Onwuegbuzie (2015) considered a balance of quantitative and qualitative approaches to effective research, as a researcher, my philosophy is mixed. I appreciate Kivunja and Kuyini's (2017) balanced approach to research that suggests attention to paradigm, epistemology, ontology, methodology, and axiology matter.

My positionality incorporates elements of interpretivist/constructivist interpretation of knowledge as subjective, that data have multiple meanings based on interaction with participants (or knowledge of participants), and the context of the situation. I have an affinity for the critical/transformational paradigm that situates research in social justice, addressing political, social, and economic

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

issues that lead to oppression (Kivunja & Kuyini, 2017, pp. 35–36). Incorporating concepts of equal access to education, practice methods that support marginalized learners, and co-creation of knowledge into my research echo the perspectives of Dewey (1933) and Freire (1970). These are deeply held beliefs and how I view the world. These paradigms include active participants. In practice, building on my strengths and weaknesses as a researcher in my current life, I prefer to advocate for learners by observing or looking at data in the aggregate rather than through direct participation with learners. This position does not negate my beliefs. I believe it reinforces how I, as a human, conducted this research, using my strengths in a way that helps learners overall.

For this dissertation, my research orientation is toward pragmatism, with associated attributes noted in Table 3 above, to solve issues in practice (Goldkuhl, 2012) using a balanced approach (Johnson & Onwuegbuzie, 2015; Kivunja & Kuyini, 2017). A brief discussion follows that describes how epistemology, ontology, and axiology affect my view and practice as a researcher.

Epistemology, Ontology, and Axiology

I appreciate the epistemology of relational or researcher's view of a problem; the ontology of relativism, or multiple realities; qualitative methodology that emphasizes participatory research, and the axiology of cultural norms of working with participants to minimize power relationships. My values reflect several aspects of Kivunja and Kuyini's (2017) research. For my study, I chose the pragmatic paradigm that situates practical knowledge in a practical research

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

method. The epistemological view is relational or relevant to the problem studied, the ontological view is non-singular reality, which is consistent with multiple realities from the interpretivist/constructivist paradigm. The methodological choice of qualitative or quantitative or both (i.e., mixed methods) connects with the axiological choice of using the approach that benefits people the most from a learning design perspective.

The theoretical framework for my research is understood as the philosophy that underpins this scoping review on how the UDL framework and learning design practices of UDI and UID have been researched in the context of an inclusive OHE environment. As a researcher, the pragmatic paradigm is the method of choice using a scoping review of existing academic and grey literature on these concepts (Cooper et al., 2019; Goldkuhl, 2012; Munn et al., 2018; Oliver et al., 2008). What does this mean in terms of this research study?

The pragmatic philosophy and approach of using the most practical research method inform how the research problem and questions were addressed. Using a scoping review of peer and non-peer-reviewed artifacts of how UDL/UDI/UID have been researched and practiced from 2000 to 2020 provided me with a corpus of existing literature to analyze with a view to extracting themes that may inform educators, researchers, and policymakers of how:

- Practices and inclusive OHE learning environments are defined and connected;

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Equitable access and digital accessibility, barriers, and key contributors influence an inclusive online OHE learning for students with disabilities, other marginalized students, and all learners; and
- Knowledge is created and understood by researchers, learning designers, teachers, and students.

Methodology

A description of the scoping review is presented in this section. The significance of the research questions and a description of the research design are discussed.

Scoping Review

My research used a scoping review within the context of an education framework (Munn et al., 2018; Peters et al., 2015) to map research evidence on the UDL framework, UDI/UID learning design practices, and their impact on an inclusive OHE. Scoping reviews are exploratory, can answer broad questions, and can aid in determining the amount of relevant evidence on a particular topic. Peters et al. (2015) noted the focus in scoping reviews is an overview of *quantity* of literature on a topic as opposed to *quality* of existing evidence, based on a specific research protocol.

Systematic and scoping reviews can be confused. Systematic reviews inform practice through a specific condition or intervention using a strict protocol to determine the quality, appropriateness, and replicability of an intervention in specific circumstances (p. 142). Both methodologies develop an *a priori* review protocol that is determined prior to beginning the review. Sucharew and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Macaluso (2019) described both types of reviews as comprehensive and structured, with scoping reviews often using methodological frameworks that develop an *a priori* review protocol before beginning the review process. Developing an *a priori* review protocol adds reliability and validity to scoping reviews, as inclusion and exclusion factors and data collection and extraction are prescribed prior to research being conducted (Aromataris & Munn, 2020; Munn et al., 2018; Peters et al., 2015). Strict protocols were developed by Joanne Briggs Institute (Aromataris & Munn, 2020; JBI Scoping Review Methodology Group, n.d.) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2021) to guide researchers and report research that follows these strict guidelines. JBI Global and PRISMA have since developed protocols for scoping reviews, as this has become a useful tool for high volumes of broad reviews of research. The protocols or an *a priori* process for this dissertation are a combination of PRISMA, in terms of data collection, and the JBI Institute, in terms of data analysis.

Munn et al. (2018) noted scoping reviews can examine emerging evidence and identify “the types of evidence that address and help inform practice in the field and the way the research was conducted” (p. 2). Although both types of reviews (systematic and scoping) are comprehensive and structured, the evidence sought through a scoping review of the UDL framework, UDI/UID learning design practices, and their impact on an inclusive OHE will include emerging evidence, such as different types of grey literature. Grey literature is a form of scholarly knowledge dissemination that precedes peer-review and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

encourages broader knowledge dissemination. Grey literature often includes preprints of academic papers that are in the peer-review process, professional or government websites, policy papers, government literature, and professional literature from scholars who are also practitioners in the field (Cooper et al., 2019). Using specific forms of grey literature can inform scholars and policymakers about upcoming research that is going through the often time-consuming peer-review process.

I chose a scoping review as I wanted to examine a broad range of emerging and existing evidence to gain a greater understanding of the equitable access and digital accessibility of UDL/UDI/UID practices in an inclusive OHE. The choice of scoping review is consistent with a pragmatic paradigm as it relates to practice knowledge, the epistemological, ontological, and axiological perspectives, as well as the research questions.

Pragmatism combines research necessary to improve practice knowledge (Dewey, 1933), regardless of paradigm. Goldkuhl (2012) identified pragmatism as a workable paradigm for his work in information systems (IS) research considering IS's connection between humans and technology. Pragmatism combines research necessary to improve practical knowledge, which could be quantitative or qualitative or mixed methods, and associated with action research or design research. Goldkuhl's research is consistent with other researchers (Johnson & Onwuegbuzie, 2015; Kivunja & Kuyini, 2017).

The pragmatic approach leads to using a scoping review as a methodological choice. The research questions are consistent with the pragmatic

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

approach as they relate to practice knowledge. As noted in the literature review, I have an affinity for equity in education, co-creation of knowledge, communities of practice, and practices such as UDL, UDI, and UID to further equity in an inclusive OHE. These are all collaborative processes that contribute to co-creation of knowledge. This was examined further with the data that was gained through collection and analysis of the research questions. This dissertation is a scoping review of peer reviewed and non-peer reviewed (grey literature) artifacts using search terms that include “UDL,” “UDI,” “UID,” “inclusive education,” AND “online higher education” and other terms related to “equity in education,” “digital accessibility,” “instructional design,” and “knowledge creation” or “co-creation of knowledge.”

Oliver et al. (2008) referred to analysis of the scoping review using a wide range of experiences gleaned from policy documents, reflections, or formal research to generate an overview of sources that are relevant to policy and practice. Some practices of digital accessibility, as outlined in Chapter 2, are applied in this dissertation and formatted as web accessible as possible, which models what my study offers through the findings.

Research Design

This scoping review data and literature were gathered on how the UDL framework and UDI/UID learning design practices have been used from 2000 to 2020. A wide range of search terms were used to gather information that appeared to be lacking in previous research on UDL (Al-Azawei et al., 2016; Roberts et al., 2011). The research tools that were used included a computer, the

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Internet, and Zotero, a bibliographic software that I applied for data collection and analysis. As this was secondary research, the setting was not directly influential. Data on literature included references to equitable access and digital accessibility in inclusive OHE learning environments, as UDL and UDI/UID are not always mentioned in inclusive learning, generally, or OHE learning environments, specifically. AU academic librarians were consulted in considering data collection including choice of databases, development of search terms and search strategies, and development of a data management plan. Including academic librarians in research strategies was an integral part of my scoping review and highly recommended.

Participants

There were no active participants in this research. As the sole researcher, I collected and synthesized empirical research artifacts in an aggregate of learners' and researchers' experiences of the UDL framework and UDI/UID practices to improve equitable access to inclusive OHE. The researcher is represented as an observer in analyzing research data in an aggregated format.

Sampling

The sample selection process for my research was determined by the inclusion and exclusion criteria outlined in Chapter 1 once third-stage analysis of full text began. The first data analysis stage screened out duplicates based on information within citations and abstracts that met the inclusion and/or exclusion criteria. One aspect of determining the sample size was the JBI data extraction

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

process called “data charting,” as suggested by Aromataris and Munn (2020). A draft form was developed that charted data extracted from the full-text analysis.

Ethical Considerations

The choice of a scoping review as the research design is consistent with the pragmatic paradigm and axiological perspective of research that adds value to benefit most people, as described in Table 3. This is consistent with my positionality. For this research I chose a pragmatic paradigm to address practice issues and a value-laden axiology that benefits most people. The scoping review examined existing peer- and non-peer-reviewed research artifacts to investigate how UDL/UDI/UID practices have been researched and used by educators. Identifying gaps in research and policymaking may lead to knowledge that can be used by researchers and policymakers in the future. No ethical concerns arose, as this scoping review collected and analyzed previously published data. This included aggregate data that do not identify individual data.

Reliability and Validity

This scoping review was conducted using an *a priori* framework described in detail in the data collection and analysis sections. Predetermined inclusion and exclusion criteria and a three-level screening process increased the reliability and validity of the research, which lies in its process.

Results

The data collection and analysis process were tracked using spreadsheets to record (a) discussions and decision points with my dissertation supervisor and committee, AU librarians, and other educators; and (b) data collection and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

analysis. Zotero was used to collect data in citation, abstract, and full-text format; remove duplicates; identify terms and themes within and across each database; and analyze full-text data. Results were captured and tracked separately in corresponding spreadsheets.

The data collection and screening process, inclusion, and exclusion criteria, and how the software were used in this enhanced scoping review to gather results are outlined in Tables 4 and 5. The data collection and analysis descriptions reflect a pre-defined *a priori* framework, adapted from JBI Scoping Review Methodology Group (n.d.) and PRISMA (2021) protocols developed for scoping reviews. The data collection process followed is presented in Table 4, while the data analysis inclusion and exclusion criteria are reflected in Table 5.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table 4

Data Collection Process and Protocols

Process	Artifacts Included	Artifacts Excluded
Identification	Artifacts identified through database search ($n = 1,228$)	
Screening	Artifacts after duplicates removed ($n = 653$) Citations, titles, abstracts, and references screened in ($n = 653$)	Duplicates excluded ($n = 575$) Exclusion criteria: <ul style="list-style-type: none"> • Non-digital, peer-reviewed, and grey literature research not published from 2000 to 2020 • Artifacts that do not include UDL/UDI/UID practices in an inclusive OHE environment with connections to equitable access and digital accessibility Artifacts excluded ($n = ?$)
Eligibility	Full-text articles assessed for eligibility ($n = 581$)	Full-text articles excluded with reasons ($n = 509$)
Included	Articles included in review for analysis ($n = 72$)	

Note: Adapted from Peters et al. (2015)

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table 5

Data Analysis Inclusion and Exclusion Criteria

Characteristics Included	Characteristics Excluded
<ul style="list-style-type: none">• Author• Date of publication• Learning design practices• Beneficiaries (learners, teachers, institutions, society)• Demographic (country of origin, language/culture, impairment/no impairment)• Research methods (quantitative, qualitative, mixed-methods)• Data analysis techniques• Key findings related to the research questions• Barriers• Key contributors	<ul style="list-style-type: none">• Artifacts describing K–12• Non-digital publications• Artifacts not published between 2000 to 2020• Artifacts not published in English

Note: Adapted from Al-Azawei et al. (2016).

Data Collection

Fifty-two AU databases, including education, distance and online learning, social sciences, psychology, health sciences, and government/global aid organizational/statistical databases, were reviewed to determine criteria for inclusion. After a discussion with AU librarians, three AU education databases were used to collect data: Academic Search Complete, Education Search Complete, and Educational Resources Information Center (ERIC). These sites included both open and closed research artifacts. The scoping review included a search for artifacts such as peer-reviewed papers and non-peer-reviewed

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

articles, websites, policy papers, and grey literature based on relevant expertise demonstrated by authors. Using targeted search terms, inclusion criteria and a three-stage process using research software helped reduce duplication and mine for data relevant to the research questions.

The three-stage data collection/analysis process using research software included: (a) aggregate a collection of artifacts to establish reliability; (b) distill collection for duplication, review abstracts and executive summaries for inclusion, and sort by research question parameters; and, (c) review remaining artifact data in detail and arrange in themes.

The original literature review of UDL + Higher Education resulted in articles that included accessibility strategies and practices without mentioning UDL, although Universal Design (UD) was mentioned (Treviranus et al., 2010). Similarly, articles by Canadian scholars Catherine Fichten, Jennison Asuncion, Roberta Thomson, and others discussed research about accessibility, inclusiveness, and UD in Canada (King et al., 2017; Thomson et al., 2015, 2017), yet there was no mention of UDL in some articles. Using broader search terms including UDL/UDI/UID and terms such as inclusive education, inclusive online higher education, digital accessibility, equitable access, instructional design, and co-creation of knowledge increased the volume of peer-reviewed and non-peer-reviewed research material to analyze. A broader array of search terms resulted in a more comprehensive picture of how practices contribute to inclusive OHE. The bibliometric analysis helped visualize themes and concepts for future research. Data collection involved three stages:

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Stage One. Data was collected in Zotero, using AU databases Academic Search Complete, Education Search Complete, and Educational Resources Information Center (ERIC).

Inclusion Criteria. Inclusion criteria helped target the amount of relevant data collected and analyzed:

- Published and unpublished digital research artifacts (empirical findings and grey literature) from 2000 to 2020, divided into 5-year sections;
- Professional or government websites, policy papers, government publications, and professional literature written by researchers and educators;
- Artifacts that included UDL as a framework and UID/UID practices in an inclusive OHE environment;
- Artifacts presented in English; and

Search Terms. Several search terms were used.

- “Universal Design for Learning” OR “UDL”
- “Universal Design for Learning” OR “UDL” AND “Inclusive Education”
- “Universal Design for Learning” OR “UDL” AND “Higher Education”
- “Universal Design for Learning” OR “UDL” AND “Online Higher Education”
- “Universal Design for Learning” OR “UDL” AND “Inclusive Online Higher Education”
- “Universal Design for Learning” OR “UDL” AND “Digital Accessibility”
- “Universal Design for Learning” OR “UDL” AND “Equitable Access”

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- “Universal Design for Learning” OR “UDL” AND “Instructional Design”
- “Universal Design for Learning” OR “UDL” AND “Knowledge creation”
OR “Co-creation of Knowledge”

Stage Two. Once first-stage artifacts were identified, citations, titles, and abstracts of each artifact were examined for duplication, inclusion criteria, and then for analysis of common terms and themes. If an abstract or executive summary did not exist, the full text of the artifact was examined to determine inclusion. The results of each stage of data collection and analysis were recorded in specific spreadsheets.

Stage Three. Complete artifacts chosen for inclusion were sorted by research question parameters (Inclusive education, online higher education, barriers, and facilitators, UDL and UDI practices, and instructional/learning design practices). These artifacts were data charted, adapting JBI Scoping Review Methodology Group’s (n.d.) protocols. Characteristics included:

- Author
- Date of publication
- Purpose of study
- Learning design practices
- Beneficiaries (learners, teachers, institutions, society)
- Demographics (country of origin, language/culture, impairment/no impairment)
- Research Methods (quantitative, qualitative, mixed-methods)
- Data analysis techniques

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Key findings that relate to the research questions
- Barriers
- Key Contributors

Exclusion criteria included articles that did not meet the following criteria:

- Non-digital, peer-reviewed, and grey literature research not published between 2000 to 2020.
- Artifacts that did not include UDL/UDI/UID practices in an inclusive OHE environment with connections to equitable access and digital accessibility.
- Artifacts that did not specifically mention online education and higher education. This ruled out numerous articles on K-12, professional development, and articles about students with disabilities that did not meet other inclusion criteria such as UDL/UDI/UID or online higher education.

Other characteristics that emerged from the stage-three analysis were listed and examined for relevance to the research topic and arranged in themes. These were identified in Zotero and captured in spreadsheets.

Data Analysis

In stage two of data collection, I used Zotero to remove duplicates and begin to identify terms and themes from titles and abstracts, within each database, then across databases. In stage three, data charting began with key information about the source identified. All research artifacts chosen for inclusion were analyzed in a full-text reading using inclusion criteria and exclusion criteria

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

outlined above, and examined for themes that emerged from the data. This resulted in analysis of the characteristics outlined in Table 5, along with key findings and barriers, and contributors to an inclusive OHE.

This scoping review used descriptive statistical analysis, which is a mixed-method approach. Data was analyzed using Zotero in a three-stage process.

Data Management Plan

A data management plan (DMP) was developed in consultation with the AU data management lead librarian using a template called DMP Assistant, an interactive software used by several Alberta universities. The interactive plan allowed me to develop the plan and have feedback from a variety of sources. For my research, it is I, the AU librarian, dissertation supervisor, and committee members who had access. The DMP captured my plan on data collection, documentation and metadata, storage and backup, preservation of files, sharing and reuse, responsibilities and resources, and ethics and legal compliance of research files. Creating a DMP has become an expectation in research to demonstrate high-quality research (R. Stobbs, personal conversation, March 29, 2022).

Summary

Chapter 3 included a discussion in two broad areas that are interconnected to provide the impetus behind my research: (a) theoretical framework; b) theoretical positionality; and, (c) methodology. My theoretical positionality as a researcher included an affinity for interpretivist/constructivist, critical/transformational, and pragmatic paradigms. I then described my

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

epistemological, ontological, and axiological beliefs that led to a choice of pragmatic paradigm for this research study.

A description of the methodology followed. The description of the methodology included data collection and analysis of a scoping review using both academic and grey literature, along with the axiology or ethics connected to my research. The data collection and analysis processes were defined to demonstrate how the research questions were posed, along with an *a priori* protocol to maintain the reliability and validity of the evidence examined in the study. A DMP was created using interactive software to capture how data was collected, used, and stored.

General results, along with key findings and barriers and contributors to an inclusive OHE are presented in Chapter 4, and followed by an interpretation of the findings of descriptive data for recommendations on how UDL/UDI/UID can be practiced in the future to contribute to an inclusive OHE environment.

Chapter 4. Results

This chapter includes results from the data collection and analysis process, including their relevance to the research questions. Following the general results, the key findings come next, followed by barriers, then contributors.

This chapter includes tables that describe present information on articles resulting from the database search. The features include research methods, data collection techniques, country of origin for articles, learning design principles, beneficiaries, disabilities/yes or no, data collection and data analysis techniques, articles written in five-year increments, along with article affiliation with UDL/UDI/UID/UD, Online Higher Education (OHE), Digital Accessibility (DA), Instructional Design (ID), Inclusive Online Education (IOE), and Knowledge Creation or Co-creation of Knowledge (KC).

General Findings

The concepts presented in this research study were created using an *a priori* framework with predetermined inclusion and exclusion criteria and a three-stage screening process. A deductive coding approach was used to organize the literature data, using initial concepts from data that emerged from the preliminary literature review.

Figure 4 reflects the percentage of articles from each database: Academic Search Complete, Education Search Complete, and Educational Resources Information Center (ERIC).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Figure 4

Resulting Articles from Database Search

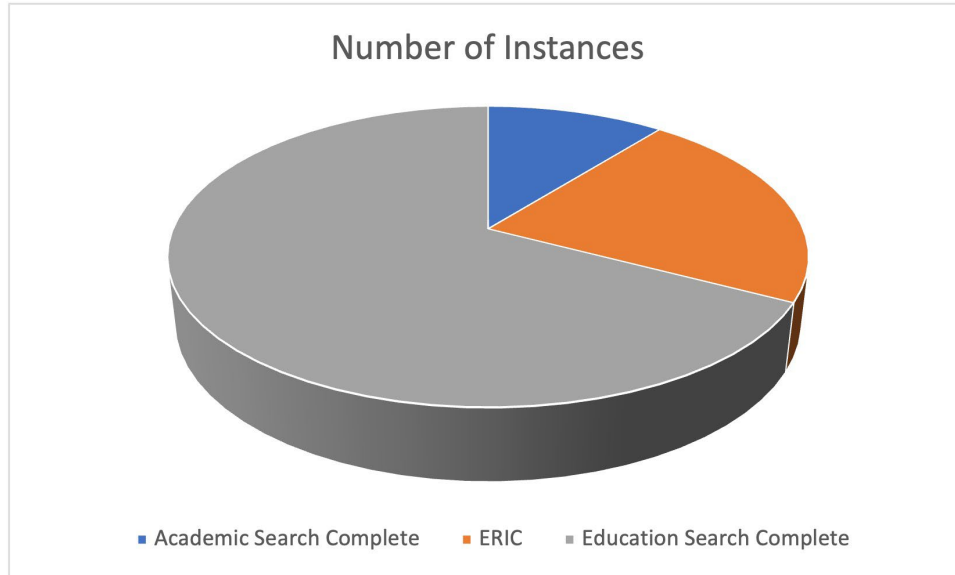


Table 6 reflects the number of articles that were originally collected from the database search (1,228). These were reduced by 575 articles once duplicates were reviewed and reduced further by 581 once a full-article review was completed. Seventy-two articles remained for review as Table 6 denotes.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table 6

Resulting Articles from Database Search of Articles

Data bases	Number of Articles	Duplicates deducted	Resulting Articles for Review	Review of full-text articles	Resulting Articles to Analyze	% of Articles to Review
Academic Search Complete (ASC)	463	<248>	215	<192>	23	10.7
Education Resource Information Centre (ERIC)	208	<77>	131	<102>	29	22.0
Education Search Complete (ESC)	557	<250>	307	<287>	20	67.3
TOTAL:	1,228	<575>	653	<581>	72	100.0

The following tables include information on country of origin for articles, learning design principles, beneficiaries, disabilities/yes or no, data collection and data analysis techniques, articles written in five-year increments, along with article affiliation with UDL/UDI/UID/UD, Online Higher Education (OHE), Digital Accessibility (DA), Instructional Design (ID), Inclusive Online Education, and Knowledge Creation or Co-creation of Knowledge (KC). Key findings, barriers and contributors are discussed separately.

Table 7 reflects the percentage of articles that were written by researchers from different countries. The majority (82%) of articles were written by researchers from the USA, while Canada had 8.2% of articles written and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

reviewed. Seven other countries were represented at 1.4% each of articles written for a total of 9.8% of articles written and reviewed.

Table 7

Country of Article Origin on UDL/UDI/UID

Country of Origin	Number of Articles	% by Country of Origin
Australia	1	1.4
Canada	6	8.2
Canada/Israel	1	1.4
Denmark	1	1.4
Slovenia/Ireland	1	1.4
South Africa/United States of America (USA)	1	1.4
United Arab Emirates /USA	1	1.4
United Kingdom	1	1.4
USA	59	82.0
Total	72	100.0

The number of times learning design principles of UDL, UDI, UID, or UD were mentioned in the articles reviewed are reflected in Table 8. Table 9 reveals the beneficiaries of the research discussed. Although students (48.6%) are ultimately the beneficiaries of the UDL/UDI/UID research discussed in the articles reviewed, faculty and the institution are beneficiaries as well.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table 8

Learning Design Principles Discussed

Learning Design Principles	Appeared in Number of Articles	% of Learning Design Principles in Articles
Universal Design (UD)	3	4.2
UD/Universal Design of Instruction (UDI)/Universal Design for Learning (UDL)	1	1.4
UD/UDL	1	1.4
UDI	7	9.8
UDI/UDL	1	1.4
UDL	47	65.0
UDL/UD	1	1.4
UDL/UDI/UID	1	1.4
UID	9	12.5
UID/UDL	1	1.4
Total:	72	99.9

Table 9

Beneficiaries of Research Discussed (Faculty, Institution, Students)

Beneficiaries	Number of Articles Reviewed	% of Beneficiaries by Type
Faculty	20	27.7
Faculty/Institutions	1	1.4
Faculty/Students	13	18.0
Faculty/Researchers	1	1.4
Students	35	48.6
Students/Institutions	2	2.8
Total:	72	99.9

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Not all articles mentioned UDL/UDI/UID in connection with students with disabilities. As Table 10 demonstrates, 54% of articles were written about students with disabilities, while 46% were written about the general population of learners.

Table 10

Students with Impairments/Disabilities

	Yes	No
Articles Citing Students with Disabilities	39	33
Percentage	54	46

Seventy-five percent of articles written used qualitative research as a research method, while 25% of articles used a mixed research method. There were no articles with research conducted using a quantitative research method. Figure 5 reflects a visual demonstration of the data in Table 11 in keeping with UDL concepts.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Figure 5

Research Methods

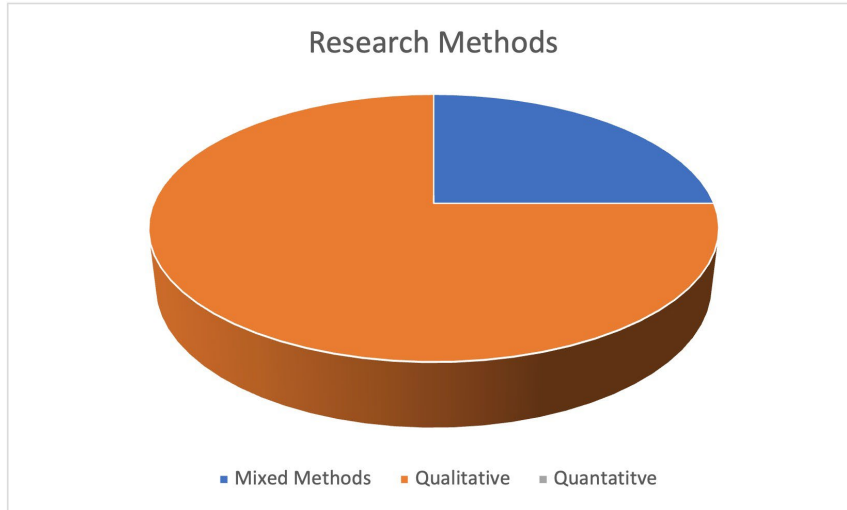


Table 11

Research Methods

Research Methods	Number of Instances	% of Research Methods Used
Mixed	18	25.0
Qualitative	54	75.0
Quantitative	0	0.00
Total	72	100.0

Literature reviews had the highest number of data collection occurrences at 47.2% (see Table 12). These were followed by case studies at 12.5%, surveys at 9.7%, surveys/interviews and action research at 6.9%, models at 4.2%, content analysis and interviews at 2.8%, and phenomenological, systematic review and two case studies at 1.4% of articles reviewed.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

The number of articles written from 2000 to 2020 in five-year increments are presented in Table 13. The number of instances increased with each five-year increment.

Table 12

Data Collection Techniques

Data Collection Techniques	Number of Instances	% of Data Collection Techniques Used
Action research	5	6.9
Case study	9	12.5
Content analysis	2	2.8
Interviews	2	2.8
Literature Review	34	47.2
Model	3	4.2
Phenomenological	1	1.4
Questionnaire, analytics	2	2.8
Survey	7	9.7
Survey, interviews	5	6.9
Systematic review	1	1.4
Two case studies	1	1.4
Total:	72	100.0

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Table 13

Articles Written in Five-Year Increments

Articles Written in Five-Year Increments	Number of Instances	% of Articles Written in Five-Year Increments
2000-2004	3	4.0
2005-2009	9	13.0
2010-2014	20	27.0
2015-2020	40	56.0
	72	100.0

Table 14 represents the article affiliation to the search terms of UDL/UDI/UID, online higher education, digital accessibility, inclusive online education, and knowledge creation. The totals in the table will overlap among different categories among the various articles reviewed.

Table 14

Article Affiliation to Search Terms

Data and Conceptual Framework Concepts					
UDL/UDI/UID/UD	Online Higher Education	Digital Accessibility	Instructional Design	Inclusive Online Education	Knowledge Creation
72	6	15	64	47	7

The following are key findings from the articles reviewed. These are categorized by Faculty, Content, and UDL/Instructional Design (ID). The key

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

findings are derived from comments made from researchers in the articles reviewed about observations or recommendations that would improve learning in an inclusive OHE environment. Key findings were established by categorizing the number of times a theme appeared from the data. These relate to the research questions.

Key Findings

Key findings, barriers, and contributors are listed below, which were derived from researcher's comments on the articles reviewed. These were generally derived by the number of times the comments appeared. There are common themes within the key findings of faculty awareness, training, and support, content and accessibility, implementation, and UDL/ID predesign, pedagogy, and student response to UDL/UID/UID practices. Barriers and contributors are separate categories and described after key findings.

Faculty Awareness/Attitudes

- There is a lack of faculty awareness of the UDL model and techniques that still create barriers (Davies et al., Fleet & Kondrashove, 2019).
- Students identify negative encounters and lower expectations from faculty (Wynants & Dennis, 2017).
- Faculty attitudes affect students with disabilities in inclusive instruction (Black et al., 2014).
- There is faculty resistance to how accommodations are addressed in higher education, as well as negative attitudes and stereotyping (Dalton et al., 2019; Singleton et al., 2019).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- A lack of faculty/staff awareness of accommodations exists. This includes an understanding of to what extent accommodations are made, and that accommodations are not seen as important or addressed by administration (Cook et al., 2009).
- Individual accommodations are costly and there is a perception they do not meet the rigour and content of traditional courses (Sapp, 2009).
- Faculty does not feel prepared to meet the needs of students with disabilities (Love et al., 2019).

Faculty Training/Support

- Increase institutional support, faculty training, and accessibility checklists (Behling, 2017).
- Provide awareness training and supports to broaden implementation (Dalton et al., 2019).
- Train faculty, access technology, and redesign curriculum (Carter et al., 2011).
- Faculty UDL training increased positive student perceptions (Davies et al., 2013).
- Invest in training for course designers and administration (McGuire, 2014).

Faculty Implementation of Accommodations and UDL Training

- Increase communication to faculty/staff about accessibility model (Bastedo et al., 2013).
- Create faculty environments that value and reward UDL implementation (Cash et al., 2020).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Create interdisciplinary collaboration and a team approach plus the effective use of technology (Chandler et al., 2017; Dinmore & Stokes, 2015).
- Use UDL to develop faculty to engage, challenge, and assess learner outcomes (Ingram et al., 2012).
- Use UDL to include faculty across multiple disciplines, administrators, course designers, and technical specialists (McGuire, 2014).
- Increase inclusive and equitable organizational change (Berger & Thanh, 2004).
- Reward proactive requests for being trained in UDL model (Bastedo et al., 2013).

Content/Accessibility

- UDL is proactive, not reactive. Make all material accessible (Catalano, 2014).
- Make accessible content, tests, and test times, multiple formats, and appropriate assistive technology available (Dalton et al., 2019).
- Use multiple ways to access information, demonstrate understanding, and engage with curriculum (Robinson & Wizer, 2016).
- Provide translation models for language barriers (Elias, 2010).
- UDL satisfies student needs while meeting course objectives (Morra & Reynolds, 2010).
- Students enjoyed the choice and challenge of multiple formats (Booth et al., 2020).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Students liked weekly assignments for regular contact with instructor and peers (Rao & Tanners, 2011).

Universal Design for Learning (UDL)/Instructional Design (ID) – Predesign

- Predesign with UDL showed positive results and allowed students to access courses without adaptation (Basham et al., 2010; Delletal, 2015).
- Preset design to adapt to all learners with flexible, accessible courses (Bernocchio, 2007).
- Predesign of UDL aids quality of inclusive virtual education and improves accessibility with no platform adjustments (Nieves et al., 2019).
- Promote inclusion with multiple means of representation; action and expression; and engagement with preset design (Woods & Leahy, 2019).

UDL/ID – Good Pedagogy

- Alternative formats have validity in student preference and practice (Fidaldo & Thomann, 2017).
- There were positive results and increased learning with the UDL framework (Booth et al., 2020).
- Emphasize content and pedagogy, consistent messaging, and structure of content (Scott & Temple, 2017).
- Inclusive practice is easier with flexibility, pedagogy, and accessibility of digital technologies (Woods & Leahy, 2019).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

UDL/ID – Student Response

- There was increased student response with increased flexibility, social presence, reduced stress, and enhanced success (Kumar & Wideman, 2014).
- There was an increased number of students that performed advanced activities after UDL implementation (Lebenicnik et al., 2015).
- Students valued a professor who was present and accessible (Lohmann et al., 2018).
- There was an increased impact of UDL on participant's learning and preparedness (Scott et al., 2015).
- Quality feedback/interaction and social connectedness/presence aids student persistence and self-regulation (Tobin, 2014).
- Students felt more in control of their learning (Carter et al., 2012).
- Students learned to learn from each other, develop new skills, and negotiate deliverables (Williams et al., 2013).

The comments above are categorized by Faculty, Content, and UDL/Instructional Design (ID). The key findings reflect comments made from researchers in the articles reviewed and generally categorized by the number of times the comments were presented.

Findings - Barriers

The following is a list of barriers to learning in an online environment that were identified by researchers in the articles chosen for review. The comments

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

are categorized into Faculty awareness/attitudes and Content (curricular) based on comments identified by researchers.

Faculty Awareness/Attitudes

- There is a lack of faculty awareness of UDL techniques and faculty attitudes that still creates barriers (Davies et al., 2013; Fleet & Kondrasov, 2019).
- Students identify negative encounters and lower expectations from faculty, along with negative attitudes and stereotyping (Wyants & Dennis, 2017).
- Students with undisclosed disabilities can still struggle in the classroom (Houston, 2018).
- There is a lack of understanding of accommodations that contributes to faculty attitudes (Singleton et al., 2019).
- There are attitudinal barriers from faculty, staff, and administration (Couillard & Higbee, 2018).
- Faculty do not feel prepared to meet the needs of students Love et al., 2019).
- Faculty and staff lack training opportunities and time to implement UDL (Dallas et al., 2013).
- There is a lack of leadership and institutional support (Carter et al., 2011).
- Students and faculty need access to appropriate technology Pace & Blue, 2016).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Content

This list refers to comments made by researchers with observations/ recommendations of curricular content that could be improved. Content was the category assigned that refers to accessibility of the materials discussed in the research articles reviewed.

- Information/communication and technology were the highest recorded barriers (Watt et al., 2014).
- Learning is restricted by one mode of learning (Booth et al., 2018).
- Content is not formatted in an accessible manner (Cash et al., 2020).
- There is a lack of visual and physical cues in online courses (Filaldo & Thomann, 2017).
- Courses based on the average learner do not help students with disabilities and other marginalized learners (Ingram et al., 2012).
- ICT skills are often developed in informal ways (Lebenicnik et al., 2015).
- There is a lack of technological strategies that inhibits students with disabilities (McMahon & Walker, 2014).
- Students express frustration with accommodation/school policies (Black et al., 2015).
- Difficulty accessing resources and lack of accessibility are barriers to student persistence (Tobin, 2014).
- An inflexible learning environment does not meet the needs of all learners

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

The barriers described above are observations or recommendations made by researchers that reflect issues with Faculty awareness/attitudes and curricular content.

Findings - Contributors

Contributors were identified by researchers as key observations or recommendations that could improve learning for students in an online environment. These are categorized into Content and Implementation.

Content

- Increased technology use by students creates the need for more variety/accessibility (Davies et al., 2013).
- Digital literacy aids student process demands (Dukes et al., 2009).
- UDI enhances teaching practice and inclusive learning environments (Wyants & Dennis et al., 2017).
- Students like multiple means of engaging in assignments and activities that interest them and help them maintain control of their learning (Kumar & Wideman, 2014; Morra & Reynolds, 2010).
- Give all students accessible online format and exams with unlimited time constraints (Pousson & Myers, 2018).

Implementation of Accommodations and UDL Training

- Provide awareness training and support to faculty and staff to broaden implementation (Black et al., 2015).
- Predesign can address goals with a defined purpose (Houston, 2018).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- The increased use of UDL aids increased satisfaction by instructors and reduced the need for disability services (Kasch, 2019).
- Explore innovative ways to include faculty in course predesign, redesign, and delivery (McGuire, 2014).
- Course design and delivery take extra effort and time to prepare (Dukes et al., 2009).
- Value and reward inclusive teaching (Cash et al., 2020).
- Create institutional guidelines for accessibility (Catalano, 2014).
- Integrate pedagogical strategies with technological tools for accessibility (Elias, 2010).
- Find a way to build trust between faculty, staff, and students (Dinmore & Stokes, 2013).
- Course design and educational practice fosters social justice and inclusion (Rogers-Shaw et al., 2018).

Summary

The results presented in this chapter include tables that describe information on country of origin for articles, learning design principles, beneficiaries, disabilities/yes or no, data collection and data analysis techniques, articles written in five-year increments, along with article affiliation with UDL/UDI/UID/UD, Online Higher Education (OHE), Digital Accessibility (DA), Instructional Design (ID), Inclusive Online Education (IOE), and Knowledge Creation or Co-creation of Knowledge (KC). Key findings were divided into several categories such as faculty awareness/attituded, training and support, and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

implementation; content and accessibility; and UDL/ID predesign, pedagogy, and student response. Findings that were identified as barriers were categorized into faculty awareness/attitudes and curricular content, while findings that were identified as contributors discussed content and implementation of UDL/UDI/UID to enhance an inclusive online learning environment. Chapter five will provide discussion and an interpretation of the research questions, limitations, recommendations for future research, and a conclusion.

Chapter 5. Discussion

In this chapter I provide discussion on the conceptual framework, top findings, recommendations for future research that emerged from this scoping review, limitations of the research, and a conclusion. This scoping review was intended to identify research gaps not previously explored.

Conceptual Framework

The conceptual framework covers concepts such as the philosophy of equity in education, an inclusive OHE learning ecosystems, pedagogical frameworks and practices such as UDL/UDI/UID, knowledge creation, and the individual learner. These were recurring themes in the literature review and data collection and analysis.

The answers to the research questions are consistent with the conceptual framework (Figure 2) that describes layers that support the individual learner. The conceptual framework allows for effective theorizing and future application of these findings.

Discussion Research Primary Question One

The primary research question will inform this research. “What is known from the existing literature about the Universal Design for Learning (UDL) framework and the practices of Universal Design of Instruction (UDI) and Universal Instructional Design (UID) and their connection to inclusive OHE learning environments?”

A considerable amount is known about the UDL framework and UDI/UID practices. Each of the 653 original articles mentioned either UDL, UDI, UID,

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

and/or Universal Design (UD). Although UDL/UDI/UID is based upon UD it is not specifically centred on learning, which is why it was not part of the original research question. After the 653 articles were distilled during the full-text analysis, five articles mentioned UD as a learning process. Fifty-three articles mentioned UDL on its own or in tandem with UDI, UID, or UD as a learning process. UID was mentioned in 12, while UDI was mentioned in 10 articles also on their own or in tandem with each other. These articles all discussed UDL/UDI/UID/UD as part of a learning process or practice.

The articles reviewed revealed that there was no research conducted using quantitative research, only mixed methods (25%) and qualitative (75%) research.

The numbers suggest a connection to three areas in the conceptual framework. These are an inclusive OHE learning ecosystem, UDL framework and UDI/UID practices. There is also a connection to the literature review (Figure 3) with the concepts of the UDL framework and UDI/UID learning design practices and equity in OHE and an inclusive OHE learning ecosystem. The inclusive OHE learning ecosystem relates to institutions, policies, technology, web accessibility, pedagogy, physiology, teachers, learners, and community. The UDL framework relates to neural networks for learning: affective, recognition, and strategic. The UDI/UID practices are based on the UDL framework and relate to instructional design (although these have been described as UDL/UDI/UID practices in my research).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

All 72 of the final articles reviewed referred to UDL/UDI/UID practices. The articles have a mixture of UDL/UDI/UID practices and elements that contribute to an inclusive OHE learning ecosystem as described above. This means all researchers in my research used UDL/UDI/UID practices with a variety of students in a variety of OHE situations. Although UDL was the preferred teaching practice as mentioned in 53 articles, UDL (12 articles) and UID (10 articles) were also mentioned specifically or in tandem in UDL practice.

Davies et al., (2013) suggested UDL training has a positive effect on student perception of their learning, while Booth et al., (2020) note there were positive results and increased learning with the UDL training. When staff and faculty experienced quality UDL training, UDL/UDI/UID practices had a positive effect on inclusive OHE learning environments.

Discussion Research Question One(a)

What does the literature reveal about how UDL/UDI/UID practices, and how inclusive OHE learning environments have been defined?

UDL/UDI/UID practices are based on an educational framework that is intended to level the playing field for students with disabilities. Treviranus and Roberts (2006) note that disability is not a personal trait but of circumstance, where a mismatch exists between the learner's needs and the education offered. UDL/UDI/UID practices open the door to multiple means of engagement, representation, and action and expression that offer accessibility to students with disabilities, marginalized learners, and all learners (Meyer et al. 2014). Fermin-Gonzalez (2019) note a growing concern for learning environments that meet the

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

needs of all learners, suggesting “inclusive e-learning designs be developed with greater emphasis on all human differences” (p.164). Fermin-Gonzalez suggested this would overcome barriers that restrict access to all learners, despite their individual learning needs. This is consistent with findings from this scoping review that the majority of articles suggested learning design strategies such as UDL/UDI/UID would benefit all learners.

Although the majority of articles suggested these learning design strategies would benefit all learners, 54% of articles used strategies specifically for students with disabilities. This is consistent with the conceptual framework concept of equity in education and the literature review concept of the impact of disabilities model on the individual learner. In defining disabilities models, Seale (2014) suggested where the medical model of disabilities places the onus on the individual with the impairment to adapt to their learning environment, the social model places the onus on the learning environment to adapt to the person with an impairment. Rather than the person changing, the social model puts emphasis on the UDL/UDI/UID practices and is thus changing the learning environment so as to have these practices benefit students with disabilities.

The UDL/UDI/UID practices contribute to an equitable education by creating teaching practices that utilize all three neural networks: affective, recognition, and strategic; are flexible; and give students control over their learning (Meyers et al., 2014).

Discussion Research Question One(b)

What is the contribution of UDL/UDI/UID in equitable access and digital accessibility to inclusive online learning for students with disabilities and other marginalized students?

All articles referenced UDL/UDI/UID/UD practices as effective learning strategies for students with disabilities, other marginalized students, and/or all learners. There were differences in how many articles specified these practices for students with disabilities, and how many referred to a general population of students. Fifty-four percent of articles were written about students with various disabilities, while 46% of articles were centred around all learners. Beneficiaries of the research discussed included 48.6% students, 27.7% faculty, 18% faculty/students, 2.8% students/institutions, and 1.4% each for faculty/institutions and faculty/researchers.

UDL/UDI/UID contribute to equitable access and digital accessibility in an inclusive OHE learning environment. This is consistent with the concept of equity in OHE and an inclusive OHE learning ecosystem from the literature review and the concept of equity in education in the conceptual framework. Dron (2018) suggested a relationship between social justice concepts and critical pedagogies. Dron suggested students and educators should contest the practices of power in a dominant society. This leads to more equitable access to education for students with disabilities, marginalized students, and all learners.

Digital accessibility features are an integral part of an accessible course learning design. Accessibility features include screen readers for visually

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

impaired individuals and the use of transcripts for hearing impaired learners (Peters & Bradbard, 2010). These features, along with fully accessible formats for learning, contribute to more student control over their learning. This helps students with disabilities, marginalized students, and all learners in a progressively more diverse higher education population (Aquino, 2016; Burns, 2020; Haug, 2017).

Discussion Research Question One(c)

What does the literature reveal about barriers affecting equitable access and digital accessibility to inclusive online learning for students with disabilities and other marginalized students in OHE learning environments?

There were several barriers identified that affect equitable access and digital accessibility to inclusive online learning. The two most frequently mentioned barriers were faculty awareness and attitudes, and curricular content. Several articles mentioned that lack of faculty awareness about UDL techniques was still creating barriers for students (Davies et al., 2013). This lack of faculty awareness, and lack of understanding of accommodations and how to deal with students that do not disclose their disabilities to administration or faculty were discussed as issues for students (Cook et al., 2009). Lack of training opportunities and time for faculty and staff to better understand these issues was a barrier. The inability to rectify these issues affected student experience with continued negative encounters and lower expectations from faculty, along with negative attitudes and stereotyping (Wyants & Dennis, 2017). Researchers

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

viewed lack of leadership and institutional support as continued attitudinal barriers for faculty, staff, and administration (Careter et al., 2012).

The following are comments on curricular content that affects student learning. Researchers commented that for many students courses designed, delivered, and taught to the average learner did not help students with disabilities and other marginalized learners (Ingram et al., 2012). An inflexible learning environment was also seen as a detriment to students and that learning is restricted by one mode of assessment, such as timed closed book exams (Booth et al., 2018). Students discussed additional time for tests and the use of multiple formats for content and assessment. Students were frustrated by a lack of understanding of accommodations and how these are understood and administered by faculty and staff, along with difficulty in obtaining content that is not formatted in an accessible manner (Cash et al., 2020; Singleton et al., 2019). Students were also frustrated by a lack of school policies surrounding accommodations (Black et al., 2015). A lack of information, communication, and technology were the highest recorded barrier for students (Watt et al., 2014). As ICT skills such as technological knowledge, online research, word processing, and data management are often learned in informal ways, a lack of technological strategies was seen to inhibit students with disabilities (Lebenicnik et al., 2015). This includes access to appropriate technology for students, faculty, and staff.

The barriers of faculty awareness/attitudes and curricular content are consistent with the conceptual framework concept of an inclusive OHE learning ecosystem as implementation of strategies to combat these barriers rests with

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

the institution. As noted, lack of institutional leadership and support are central to an inability for faculty, staff, and students to function effectively in the areas of accommodation and development of curricular content (Careter et al., 2011). The resources for accommodations and UDL/UDI/UID practices rest with the institution to develop policies and supporting processes to provide time and money to implement training.

Discussion Research Question One(d)

What does the literature reveal about key contributors to equitable access and digital accessibility to inclusive online learning for students with disabilities and other marginalized students in OHE learning environments?

Key contributors were characterized as content and implementation. In the area of content, researchers indicated students liked multiple means of engaging in assignments and activities such as offering ways of customizing the display of information, optimizing access to tools and assistive technologies, and optimizing choice and autonomy in ways (NCAC, n.d.) that interested them and helped them maintain control of their learning. Practices such as UDI were viewed as enhancing teaching practice and inclusive learning environments. As well, student's increased technology use was viewed as creating a demand for more variety in approaches to learning and accessibility tools such as speech to text or written transcripts of audio and video clips, which aid student process demands (Davies et al., 2013). Researchers noted the increased use of UDL increased satisfaction by instructors and reduced the need for disability services (Kasch, 2019).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Feedback on implementation included providing awareness training and support to faculty and staff overall (Black et al., 2015), and by creating multidisciplinary teams in course predesign to broaden implementation of UDL/UDI/UID practices in an inclusive learning environment (Nieves et al., 2019). Exploring innovative ways to include faculty and staff in course predesign, redesign, and delivery of courses was discussed (McGuire, 2014), as well as the belief that predesign aids in helping to address goals with a defined purpose (Houston, 2018). Course design and educational practice were viewed as fostering social justice and inclusion (Rogers-Shaw et al., 2018; Al-Azawei et al., 2016; Banfield-Hardaway, 2010). There was acknowledgement that applying the best practices of UDL/UDI/UID takes time and effort (Dukes et al., 2009).

Suggestions for institutional support include valuing and rewarding inclusive teaching (Cash et al., 2020), creating institutional guidelines for accessibility (Catalano, 2014), and integrating pedagogical strategies with technological tools for accessibility (Elias, 2010). Finding a way to build trust between faculty, staff, and students was also viewed as important. Dinmore & Stokes (2015) note that curriculum reform is an enormous task. They suggest fostering trust through a consultation process with faculty, staff, and students with a strong communication strategy with a feedback loop back to those who participated in the consultation. They note the effort is a UDL strategy that is a “readily, implementable, progressive culture shift” that supports an inclusive learning environment.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Development of curricular content and implementation of UDL practices in an institution, as described above, are consistent with the concept of inclusive OHE learning ecosystems from the conceptual framework. Institutions are responsible for policies and implementation of resources such as technology/web, and practices of good pedagogy are integral to an inclusive OHE learning environment (Woods & Leahy, 2019). This relates to barriers to an inclusive learning environment and key contributors as well. The contributors are the solution to barriers that exist in this environment.

Discussion Research Question One(e)

How have UDL/UDI/UID instructional design practices been applied in inclusive OHE learning environments? Are there demonstrated gains for students with disabilities, other marginalized students, and/or all learners?

The UDL/UDI/UID practices have been applied in a variety of ways. Instructional design practices have been applied in each of the article's studies. Sixty-five percent of articles written were about UDL, with the remaining percentage of articles written were about a combination of UDI, UID, and UD separately or in tandem with each other. In addition to consistency with the UDL practices and instructional design concepts and equity in education from the conceptual framework, there is a relationship to the UDL framework and UDI/UID learning design practices in the literature review. There is also a relationship to an equitable OHE and inclusive OHE learning ecosystem from the literature review. UDL is based on the theoretical approach that guides learning that supports all learners (Hall, 2003), although the approach was originally designed

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

to meet the educational needs of students with disabilities. The UDL guidelines, originally developed by CAST scholars and practitioners, are more inclusive due to a UDL Rising to Equity initiative (CAST, 2018a) and updated through research and practice. Pedagogy and technology enable an engaging, social classroom. Socially designed technological approaches such as wikis, collaborative tagging, and blogging can be instrumental in creating knowledge among learners (Dron & Anderson, 2008).

All articles mentioned UDL/UDI/UID/UD learning design practices alone or in tandem with each other. Sixty-four articles mentioned instructional design as key to the success of the learning design practices; while 47 noted inclusive online education, 15 noted digital accessibility, seven noted knowledge creation, and six noted online higher education as key to student success.

Although most of the articles were written by researchers from the USA and Canada, other countries of origin for researchers were Australia, Canada/Israel, Denmark, Slovenia/Ireland, South Africa/USA, United Arab Emirates/USA, and United Kingdom. Ninety percent of articles were written by North American researchers, while 10% were written by researchers from a combination of other countries. This is consistent with findings from Al-Azawei et al, (2016) that the majority of articles written about UDL were written by researchers from the USA.

The demonstrated gains from the scoping review include discussions on how UDL/UDI/UID/UD were applied in a variety of situations for students with disabilities, such as intellectual disabilities, learning disabilities, visually impaired,

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

and hearing disabled. There was also discussion on gains demonstrated for marginalized students and all learners. Two articles discussed using UDL practices in relation to cultural identity and one article promoted UDL practices in relation to gender identity. Culturally responsive teaching plays a role in promoting language that is inclusive and respectful and not gender-limiting (Kieran & Anderson, 2019). The definition of inclusive education is being expanded to working with students from racial, ethnic, gender, and sexually diverse backgrounds (Aquino, 2016; Haug, 2017). In addition to gains for learners, there are also demonstrated gains for the institution such as student retention, student learning gains in grades, and higher student satisfaction with the course(s)/program.

Discussion Research Question One(f)

How is UDL's role in increasing awareness or practice of co-creating knowledge in inclusive online learning environments among educator, student, and content described in the literature?

Seven articles noted the practice of co-creating knowledge. These were related to faculty co-creating courses and teacher educators co-creating knowledge with students. There were no recorded instances of students co-creating knowledge in peer-to-peer environments. The seven articles related to faculty co-creating courses together, which is common. The other aspect of knowledge creation was with teacher educators creating course content with their students as part of their assignments. In each instance the focus of the article was on using UDL/UDI/UID practices to enable course content in accessible

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

formats by using the principles of multiple means of engagement, representation, and action and expression. Although there were no instances of peer-to-peer learning in the research articles, peer-to-peer learning is part of UDL/UDI/UID practices.

The concept of co-creating knowledge is not new. Freire's (1970) concept of critical consciousness began with his educational approach of critically discussing power relationship issues with his students in what he called critical co-investigators in a community of learning. Freire's philosophy was based on Dewey's' (1938) beliefs about creating knowledge between educator and student through dialogue and self-reflection.

Co-creating knowledge in this way diminishes the power relationship between educator and student, promoting equitable approaches to education. Co-creating knowledge is also consistent with Meyer et al.'s (2014) concept of UDL expert educators and learners in which the goal of an expert learner is met through interaction between the learner, educators, and system or environment. This is a community of learning as mentioned in Wenger et al.'s (2002) community of practice concept. The community or environment is also mentioned in Scheer's et al.'s (2012) concept of constructivist thinking where knowledge is created between the student and a community or environment of learners. This is consistent with the concept of equity in OHE and an inclusive learning ecosystem from the literature review and the concept of knowledge creation from the conceptual framework.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

The learner is an integral part of UDL practices and is involved in each aspect of the conceptual framework. The learner has variable yet predictable perceptions to a certain degree based on the learner’s neurological makeup (Meyers et al., 2014). Table 15 notes the affiliation between the research question, the research subquestions, and the conceptual framework. The research questions are abbreviated.

Table 15

Research Question Affiliation to Conceptual Framework

Research Question (RQ) Short version	Conceptual Framework Concepts
RQ One: What is known about the UDL framework and the UDI and UID practices and their connection to inclusive OHE learning environments?	<ul style="list-style-type: none"> • Inclusive Online Education • UDL Framework • UDI/UID practices • Individual Learner
RQ One (a): What does the literature reveal about how UDL practices and OHE learning environments have been defined?	<ul style="list-style-type: none"> • Equity in Education • Individual Learner
RQ One (b): What is the contribution of UDL/UDI/UID in equitable access and digital accessibility to inclusive online learning for students with disabilities and other marginalized learners?	<ul style="list-style-type: none"> • Equity in Education • Individual Learner
RQ One (c): What does the literature say about barriers?	<ul style="list-style-type: none"> • Inclusive Online Learning Ecosystem • Individual Learner
RQ One (d): What does the literature reveal about key contributors?	<ul style="list-style-type: none"> • Inclusive Online Learning Ecosystem • Individual Learner
RQ One (e): How have UDL practices been applied? Are there demonstrated gains?	<ul style="list-style-type: none"> • Equity in Education • UDL Framework • UDI/UID Practices • Individual Learner
RQ One (f): What is UDL’s role in co-creation of knowledge?	<ul style="list-style-type: none"> • Knowledge Creation • Individual Learner

Top Findings

The top findings were established as of highest importance by reviewing the key findings, barriers, and contributors overall, then looking at the number of times these were mentioned. These were the most common themes that emerged from the data and are highlighted below. Some of the top findings include faculty awareness/attitudes, faculty training/support, implementation, content/accessibility, and UDL/ID predesign, good pedagogy, and student response. These descriptions are offered to expand on the researcher's comments in relation to the research questions and an inclusive OHE.

Faculty

Barriers to implementation of UDL/UDI/UID practices include faculty awareness and attitudes toward accommodations and working with students with disabilities. Lack of awareness of the UDL model and techniques still create barriers, as does a lack of knowledge of types of accommodations, and to what extent accommodations are made (Cook et al., 2009). Additionally, administrators may not prioritize student accommodation. Individual accommodations are costly in cost of technology and time for staff to administer these effectively. There is a perception by some faculty that accommodations do not meet the rigour and content of traditional courses (Sapp, 2009). Hence, there is faculty resistance to how accommodations are addressed in higher education. Faculty attitudes affect students with disabilities in inclusive instruction as students with disabilities report negative encounters and lower expectations from faculty (Wyantas & Dennis, 2017). Many faculty do not feel prepared to meet the

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

needs of students with disabilities as they may not be supported by their institution (Love et al., 2019). Faculty UDL training resulted in positive increased student perceptions of faculty and the institution (Davies et al., 2013).

Implementation of Accommodations and UDL Training

Some suggestions to assist with implementation of accommodations and UDL training include increasing institutional support for faculty awareness and accommodations/UDL specific training by offering training, investment in training for course designers and administration, and increasing access to technology and curriculum redesign (McGuire, 2014). This is consistent with creating an inclusive OHE and consistent with the necessity for an inclusive online ecosystem from the conceptual framework.

Other suggestions to broaden implementation are to increase inclusive and equitable organizational change by creating faculty environments that value and reward UDL implementation (eg. faculty recognition, awards, release time) (Cash et al., 2009); creating interdisciplinary collaboration and team work to include faculty and staff across multiple disciplines, administrators, course designers, and technical specialists (McGuire, 2014); and developing faculty to engage, challenge, and assess learner outcomes (Ingram et al., 2012). This would develop a cohesive environment to make change. Other recommendations include increasing communication to faculty and staff about an accessibility model such as UDL and rewarding proactive requests for faculty to train in the UDL model (Bastedo et al., 2013). Some faculty are interested in course

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

predesign, redesign, and delivery but may not know how to begin or to what extent their efforts were valued or even accepted.

Content

For this research, content includes findings about curricular content such as format and how material is presented to the student. Some reports from researchers about students are that students enjoyed the choice and challenge of multiple formats (Booth et al., 2020). Students also appreciated weekly assignments and regular contact with their instructor and peers (Rao & Tanners, 2011). Many students noted that UDL satisfies their needs while meeting course objectives. UDL was viewed as proactive, not reactive and researchers urged administration to make all materials and content accessible, to provide translation models for language barriers, to increase test times, multiple formats and appropriate technology, and to increase multiple ways to access information, demonstrate understanding, and engage with curriculum (Catalano, 2014; Dalton et al., 2019).

UDL/Instructional Design (ID) Predesign

Predesign is the first phase of course development in which necessary information about how the course will meet the needs of learners and engage them in the process. Researchers found that predesign with UDL showed positive results and allowed students to access courses without adaptation (Basham et al., 2010; Dell et al., 2015). Predesign of UDL aided quality of inclusive virtual education and improved accessibility with no platform adjustments (Nieves et al., 2019). Pre-set design is the same as predesign; it is

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

simply different terminology used by researchers in their comments. Pre-set design helped promote inclusion, along with multiple means of representation, engagement, and action and expression (Woods & Leahy, 2019). The adaptability of pre-set design allowed all learners flexible, accessible courses.

UDL/ID Good Pedagogy

An effective online pedagogy emphasizes student-centred learning, uses active learning activities, and pays attention to social, cognitive, and teacher presence. Researchers found that UDL showed positive results and increased learning (Booth et al., 2020) and that alternative formats have validity in student preference and practice (Scott & Temple, 2017). Content and pedagogy were emphasized with consistent messaging and structure of content. Flexibility, good pedagogy that engages students, and accessibility of digital technologies aids inclusive practice (Woods & Leahy, 2019).

UDL/ID Student Response

Several researchers included student's response or perception of UDL/UDI/UID practices, and how these are managed in their institution. There was increased student response with increased flexibility, social presence, reduced stress, and enhanced success with UDL (Kumar & Wideman, 2014). Researchers found increased impact of UDL on participant's learning and preparedness (Scott et al., 2015), along with an increased number of students who performed advanced activities (Lebenicik et al., 2015). Quality feedback/interaction and social connectedness/presence helped student persistence and self-regulation (Tobin, 2014). Students felt more in control of

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

their learning (Carter et al., 2012) and learned to learn from each other, develop new skills, and negotiate deliverables (Williams et al., 2013). These responses relate to student recruitment and retention, grade and emotional success, and the likelihood of students taking another course or program.

Recommendations for Future Research

There are several recommendations for future research. These relate to faculty and institutional responsibility for implementation, increased attention to the accessibility of course content, increased attention to UDL/UDI/UID instructional design practices, and co-creation of knowledge. There is one methodological recommendation regarding the necessity for involvement of academic librarians in graduate and faculty research. Attention to these recommendations could improve the inclusiveness of courses and programs for higher education institutions.

Faculty and Institutional Responsibility for Implementation

Although several comments were noted about faculty awareness/attitudes and training that led to student dissatisfaction among students with disabilities, the institution bears responsibility for the successful implementation of UDL/UDI/UID practices. There was a lack of awareness among faculty about accommodations for students with disabilities that affected how faculty perceived these students (Dalton et al., 2019; Singleton, 2019). Students reported negative encounters and lower expectations from faculty, along with negative attitudes and stereotyping (Wyants & Dennis, 2017). Providing training to faculty in how and why accommodations are made for students with disabilities would have a

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

positive effect on faculty attitudes. Researchers found an increase in instructor skill decreased demand on accessibility center staff and resources (Kasch, 2019). This would improve student perception of their learning experiences overall. This requires institutional support for faculty to have extra time to train on UDL/UDI/UID practices. Working in multidisciplinary teams of faculty, course designers, and technological specialists would enable faculty to design and implement changes to make their courses more accessible (McGuire, 2014). Valuing and rewarding faculty for positive changes to their courses would provide an incentive for them to make change (Cash et al., 2009). Faculty, staff, and administrators are all part of a community charged with meeting the needs of students in higher education programs. The National Research Council (2000) views community-centered learning environments as key to student success.

This recommendation could be implemented with a comprehensive strategic plan at the institutional level that incorporates increased attention to course content, increased attention to instructional design practices, and co-creation of knowledge. The strategic plan could include executive level championship of the plan, additional time and money for faculty and other staff to incorporate UDL and accommodations training, and recognition/release time for faculty and staff who incorporate UDL and accommodations into their courses.

A significant addition to the strategic plan would be a multi-disciplinary, ongoing working group of professionals that advise on pre-design, design, or redesign of each course or program. As an ongoing and permanent strategy to enhance consistency across courses and programs, this team would be involved

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

in the development of courses to ensure consistency of UDL practices such as accessibility of content, adherence to technological/web accessibility, and co-creation of knowledge, Recommendations include faculty, instructional designers, UDL and accommodation specialists, technology specialists, content experts, academic librarians, and the learner. Consistency across the courses and programs would ensure the institution is able to carry out its legal and ethical obligations, and garner a reputation as an institution that provides a nurturing, flexible, and inclusive higher education learning environment among students with disabilities, marginalized populations, and international students. The roles and contributions of each of these professionals is significant as they relate to developing flexible, inclusive courses and programs that incorporate UDL practices. The learner is an integral part of the conceptual framework, as noted in Figure 2. Perhaps the learner could be represented by specially trained members of a student association, such as the Athabasca University Graduate Student Association, or as part of a long-term practicum for graduate students.

Increased Attention to the Accessibility of Course Content

There were many comments on the need for increased attention to the accessibility of course content with learning practices such as UDL/UDI/UID. There were statements about the rationale for increased accessibility such as the increased satisfaction of students that enjoyed the choice and challenge of multiple formats (Booth et al., 2020), and faculty confidence that multiple ways to access information, demonstrate understanding, and engage with the curriculum would help meet course objectives (Morra & Reynolds, 2010). In addition to

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

multiple formats, researchers suggested students have accessible online format, increased test times, and appropriate technology to enable a more inclusive learning environment (Dalton et al., 2019). This is consistent with researchers that promote the need for online courses to reflect the diversity of higher education populations with learning strategies that are flexible and supportive of instructional design practices like UDL (Jimenez et al, 2007; Meyer et al., 2014; Rao & Tanners, 2011; Seale, 2014). Meyer et al. (2014) noted that practices such as UDL/UDI/UID contribute to equitable access in creating an inclusive learning environment.

This recommendation could be implemented as part of the strategic plan to have UDL specialists design accessible content and ensure IT specialists have incorporated website accessibility best practices. This may also be an opportunity (here and with instructional design) to have UDL specialists utilize AI, such as Ludia (Novak, 2023). UDL researcher and practitioner Novak suggests using Ludia to produce quality enhancements to UDL course design.

Increased Attention to Instructional Design Practices

An increased attention to UDL/UDI/UID instructional design practices stems from a philosophy of predesign and good pedagogy in developing and delivering accessible courses. According to Eitzen et al. (2016) UDL is intended to predesign courses to meet the needs of all learners, as opposed to retrofitting courses to reach some learners. Predesign improves accessibility with no platform adjustments and no adaptation required by students. Student inclusion benefits from multiple means of representation, engagement, and action and

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

expression as students can access content through multiple formats. These areas could be considered for future research.

This recommendation could be implemented as part of a strategic plan that incorporates a working group of faculty and staff. These would include accommodations specialists, UDL specialists, library technicians, IT specialists, and instructional designers to help develop course content that is accessible and consistent across courses, programs, and faculties. This would strengthen individual and institutional knowledge.

Co-Creation of Knowledge

Co-creation of knowledge is part of the conceptual framework and discusses the co-creation of knowledge between teachers and learners (Freire, 1970; Wenger et al., 2002) and the concept of the UDL framework that contribute to an understanding of knowledge co-creation (Meyer et al., 2014). There were seven articles that refer to this trend as teachers and learners as teacher educators, who created knowledge with their students, thus creating course content together in these studies. The concept of UDL expert learners also refers to co-creation of knowledge within an expert learning environment of learners, teachers, and systems. Although there were no articles of students co-creating knowledge in a peer-to-peer environment, this is a technique that is used in UDL as part of multiple means of representation, engagement, and action and expression (Meyer et al., 2014; Rao and Tanner, 2011). Considering increased interest in knowledge about content creation, it is possible co-creation of knowledge should be studied in more depth. Some researchers suggest

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

knowledge creation will develop and maintain increased interest due to the rapid development of participatory digital technologies (Meyer et al., 2014, Rappolt-Schichtmann, 2012; Tobin, 2018).

This recommendation could be implemented as part of the strategic plan to use the working group mentioned above to incorporate co-creation of knowledge into the course syllabus. Strategies such as peer to peer and faculty-learner co-creation would strengthen flexibility of course content as part of a UDL strategy.

Involvement of Academic Librarians

Providing research data services such as digital curation and data management planning to students is an integral part of creating an expert learner, as these students strive to continuously improve their learning (Meyer et al., 2014; Tenopir et al., 2013). There is increased attention to the role of academic librarians in preparing students and faculty for research projects (Frederick & Run, 2019; Gabby & Shoham, 2017). For this scoping review, AU academic librarians provided their expertise in database selection, search strategies, and assisted with the storage and preservation requirements of data management planning.

This recommendation could be implemented as part of the strategic plan as members of the working group. Their services could be promoted in student orientations and discussions with professors, as standing members of faculty councils, and with regular workshops to demonstrate their expertise in ensuring academic integrity and fulfilling academic writing and research requirements.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Other areas of research may be lack of quantitative research on UDL, and the absence of grey literature discovered when broadening search terms that are discussed in the conclusion.

Limitations

The scoping review was limited by ten articles that I did not review behind journal paywalls. Some articles were only available through closed websites, which required purchase of journal articles and not available through the AU library.. All others were available through the AU library. This decision was due to cost and my belief that researchers interested in UDL/equity may practice academic inequity by publishing their work in closed-copyright journals rather than open access journals.

There were many research articles using qualitative research methods, and some mixed methods research methods. However, there were no articles using quantitative research which may give different results or a more comprehensive view of how UDL/UDI/UID practices are used in inclusive learning environments.

The initial data collection using only terms used in the conceptual framework resulted in few or no articles. The search criteria were widened using targeted search terms and inclusion criteria, in consultation with AU academic librarians, and the use of Zotero software to capture and analyze information. A manual review and software review was conducted on the 1,228 articles that were originally collected with the inclusion criteria. This was distilled down to 653 articles after duplicates were reviewed and distilled further once a manual full-

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

article review was completed. Both peer-reviewed and grey literature were included in the search terms, inclusion criteria, and an *a priori* process but only journal articles remained after the manual full-article review. Although I included grey literature in the search terms and inclusion criteria the only grey literature included after the search were calendar of events and notices of conference, without the full conference information being provided. The use of Zotero and a manual review following an *a priori* process added to the reliability, validity, and knowledge dissemination of the data analysis. Using the *a priori* process was intended to overcome potential bias due to my positionality as an educator who completed most of their higher education and professional activities in an online format.

This scoping review mined literature that may not have been comprehensively reviewed, paving the way for a more precise systematic review using similar databases and inclusion/exclusion criteria that researchers may use to target gaps in data synthesized from a scoping review. Peters et al. (2015) noted, “Scoping reviews may also be undertaken as exercises in and of themselves to summarize and disseminate research findings, to identify research gaps, and to make recommendations for future research” (p. 141). This scoping review collected and analyzed data from existing peer-reviewed artifacts on how UDL/UDI/UID have been used in an inclusive OHE and provided evidence for actions such as a strategic plan.

Conclusion

The purpose of this research was to explore how UDL has been examined in the context of an inclusive OHE, with associated equitable access and digital accessibility. Results of the scoping review provided data on how UDL/UDI/UID practices have influenced equitable access and digital accessibility, along with identifying barriers and key contributors to equitable access and digital accessibility. The results could be used by institutions to research the higher education learning experience for undergraduate students that have been exposed to UDL in their studies and would have a higher expectation of a flexible learning environment. The articles that met the scoping review criteria discussed best practices in how UDL/UDI/UID practices have evolved and created more inclusive online learning environments in higher education. The results are consistent with the conceptual framework (Figure 2) of philosophy of equitable education; inclusive OHE learning ecosystems; UDL Framework; UDI/UID practices; knowledge creation and how these contribute to an inclusive online learning environment for the individual learner. The individual learner is supported by all elements in the conceptual framework.

The decision to use a scoping review for this research was based on the desire to map research evidence about UDL/UDI/UID practices and their contribution to an inclusive online higher education. Scoping reviews are developed through an *a priori* protocol that is established prior to any data being collected. The *a priori* protocol adds to reliability and validity of the research as the inclusion and exclusion criteria, and data collection and analysis are

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

established prior to evidence being collected (Aromataris & Munn; Munn et al., 2018; Peters et al., 2015). Inclusion criteria included peer-reviewed and grey literature artifacts that were available in digital format, written in English between 2000-2020, and written about UDL/UDI/UID practices in an online higher education environment. Exclusion criteria included non-digital, peer-reviewed, and grey literature research not published between 2000-2020, and research artifacts that did not include UDL/UDI/UID practices in an inclusive OHE environment with connections to equitable access and digital accessibility.

Data were collected manually and with research software (Zotero) in a three-stage process. These included to a) aggregate a collection of artifacts using an *a priori* protocol to establish reliability; b) distill collection for duplicates, review abstracts and executive summaries for inclusion, and sort by research question parameters; and c) review full-text articles manually and using Zotero in detail and arrange in themes.

The original search terms of online higher education, digital accessibility, inclusive online education, instructional design, equitable access, and knowledge creation resulted in very few, if any, results. Additional search terms such as elearning, virtual learning, online accessibility, virtual accessibility, online instructional design, learning design, virtual learning design, inclusive virtual education, students with disabilities, inclusive access, creation of knowledge were used after consultation with AU academic librarians. Broadening the search terms was necessary to expand the number of artifacts collected, although there were no artifacts gleaned from grey literature as hoped. This is consistent with

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

findings from Al-Azawei et al., (2016) in their research on UDL that more data may have been available with broadening search terms. Al-Azawei et al., also found that the majority of articles they reviewed in their research were mainly about research in the USA. This is consistent with this researcher's findings that 82% of articles reviewed were investigated by USA researchers. Perhaps these are areas that could be explored in future research.

There has been increased attention to UDL/UDI/UID practices between 2000-2020. From 2000-2004, 4% of articles reviewed were written about UDL/UDI/UID; 13% were written between 2005-2009; 27% were written between 2010-2014; and 56% were written between 2015-2020. This demonstrates an incremental increase in UDL research. Of these articles, 25% of researchers used mixed methods research, while 75% used qualitative methods. There were no articles reviewed that used quantitative research methods. Perhaps this is an area for future research.

The findings of my research support the idea that UDL/UDI/UID practices have had increased attention since 2000, with an incremental increase from 2000-2020 as noted by the statistics described above. More researchers have begun to examine UDL/UDI/UID practices.. Most articles reviewed discussed research on how these practices have contributed to an inclusive online higher education. The articles reviewed led to answers to research questions of how UDL/UDI/UID have been defined; the contribution of UDL/UDI/UID to inclusive online learning for students with disabilities, and other marginalized students; barriers and key contributors affecting inclusive online

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

higher education; how UDL/UDI/UID instructional design practices have been applied; and UDL's role in the practice of knowledge creation.

Recommendations include faculty/institution responsibility for implementation; increased attention to accessibility of course content; increased attention to instructional design practices, co-creation of knowledge, and increased involvement of academic librarians in research and teaching. As noted above, these recommendations could be implemented as part of a comprehensive strategic plan that includes executive championship of the plan, time and money to allow faculty and staff to incorporate these ideas, and working groups of faculty and specialists to incorporate UDL and accommodations into course content and co-creation of knowledge. This would ensure legal and ethical obligations and garner a positive reputation as an inclusive institution of higher learning.

Next steps for my research could include acting on the recommendations outlined as part of an institutional strategic plan. Perhaps future research could examine how UDL practices and accommodations training are incorporated into a higher education or professional development learning environment. Other areas for scrutiny may involve examining why there appears to be no quantitative research on UDL practices and why there was no grey literature of value that emerged from my research.

Understanding factors that contribute to an inclusive OHE may help fulfill legal and ethical obligations for students with disabilities and all learners (Edyburn, 2010). To maintain the concept of research practicality, knowledge

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

gained from this research will be disseminated in a variety of ways to share with educators, researchers, and policymakers. As a doctoral candidate, and through my work as a tutor, I will take advantage of opportunities to share this research, such as:

- AU's Graduate Student Research Conference;
- Share results with Teaching and Learning Centres across Canada, such as the CIDER research network at AU;
- Research presentations as a graduate student and an educator;
- Develop journal articles that profile findings from my research to share on open-access sites;
- Develop poster to present virtually and in person, where possible;
- Taglines on my professional AU email that include social media taglines that provide a link to my dissertation abstract and journal publications;
- Seek publication of my results in JBI Global and PRISMA sites, as these are central to the way scoping reviews are conducted.

This evidence may be used to delve further into how UDL/UDI/UID practices contribute to an inclusive OHE learning environment.

Creating an inclusive OHE learning environment using UDL/UDI/UID practices is a substantial load for one, or even a few, faculty or staff members. Leveraging these practices using a community of educators, staff, administrators, and students requires commitment at the institutional level. Paying attention to faculty awareness and training, content creation, and creating an environment

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

that values and rewards faculty and staff in implementing UDL/UDI/UID practices would help realize the benefits these practices promise.

References

- Al-Azawei, A., Serenelli, F., & Lundquist, K. (2016). Universal design for learning (UDL): A content analysis of peer-reviewed journal papers from 2012-2015. *Journal of Scholarship of Teaching and Learning*, 16(3), 39–56.
- Alberta Human Rights Commission. (2021, April). *Duty to accommodate students with disabilities in post-secondary educational institutions*.
- Aliyu, A. A., Singhry, I. M., Adamu, H., & Abubakar, M. (2015, December). Ontology, epistemology and axiology in quantitative and qualitative research: Elucidation of the research philosophical misconception. In *Proceedings to the Academic Conference. Mediterranean Publications & Research International on New Direction and Uncommon* (Vol. 2, pp. 1–26). University of Agric.
- Americans with Disabilities Act of 1990*.
- Aquino, K. C., (2016). *The disability-diversity disconnect: Redefining the role of student disability within the postsecondary environment* [Dissertation, Seton Hall University].
- Aromataris, E., & Munn, Z. (Eds.). (2020). *JBI manual for evidence synthesis*.
- Athabasca University. (2013). *Accessibility guidelines for course delivery*.
- Athabasca University. (2022, March 11). *Formatting for the Web: Accessibility. AU Guidelines*.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Basham, J. D., Lowrey, K. A., & deNoyelles, A. (2010). Computer mediated communication in the universal design for learning framework for preparation of special education teachers. *Journal of Special Education Technology, 25*(2), 31–44.
- Bastedo, K., Sugar, A., Swenson, N., & Vargas, J. (2013). Programmatic, systematic, automatic: An online course accessibility support model. *Journal of Asynchronous Learning Networks, 17*(3), 87–101.
- Bates, T. (2024, June 13). *Quality and equity in digital learning: a policy brief from the Commonwealth of Learning*. Online Learning and Distance Education Resources.
- Beck, T., Diaz del Castillo, P., Fovet, F., Mole, H., & Noga, B. (2014). Applying universal design to disability service provision: Outcome analysis of a UD audit. *Journal of Post-Secondary Education and Disability, 27*(2), 209–222.
- Berger, Joseph B., & Thanh, D. (2004). Leading organizations for universal design. *Equity & Excellence in Education, 37*(2), 124–134.
- Bernacchio, C., Ross, F., Washburn, K., Whitney, J., & Wood, Diane R. (2007). Faculty collaboration to improve equity, access, and inclusion in higher education. *Equity & Excellence in Education, 40*(1), 56–66.
- Black, D. R., Weinberg, L. A., & Brodwin, M. G. (2015). Universal design for learning and instruction: Perspectives of students with disabilities in higher education. *Exceptionality Education International, 25*(2), 1–26.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Boothe, K. A., Lohmann, M. J., & Owiny, R. (2020). Enhancing student learning in the online instructional environment through the use of universal design for learning. *Networks: An Online Journal for Teacher Research*, 22(1).
- Bozkurt, A. (2019). From distance education to open and distance learning: A holistic evaluation of history, definitions, and theories. In S. Sisman-Ugur & G. Kurubacak (Eds.), *Handbook of research on learning in the age of transhumanism* (pp. 252–273). IGI Global.
- Burgstahler, S. (2013). Preface. In S. Burgstahler (Ed.), *Universal design in higher education: Promising practices*. DO-IT, University of Washington.
- Burgstahler, S. (2017). *Equal access: Universal design of instruction (UDI): A checklist for inclusive teaching*. DO-IT, University of Washington.
- Burgstahler, S. (2020). *Universal design of instruction (UDI): Definition, principles, guidelines, and examples*. DO-IT, University of Washington.
- Burgstahler, S., Havel, A., Seale, J., & Olenik-Semesh, D. (2020). Accessibility frameworks and models: Exploring the potential for a paradigm shift. In J. Seale (Ed.), *Improving accessible digital practices in higher education* (pp. 15–72). Palgrave Macmillan.
- Burns, E. M. (2020). Book review of *Disability as diversity in higher education: Policies and practices to enhance student success*, edited by E. Kim & K. C. Aquino]. *Journal of Critical Scholarship on Higher Education and Student Affairs*, 5(2), Article 6.
- Canadian Alliance of Student Associations. (2021, June 9). *Continued concerns: Post-secondary students one year into COVID-19*.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Canadian Association of University Teachers. (2021, April). *The rise of performance-based funding*.

Canadian School Boards Association. (n.d.). *Public education in Canada: How does the Canadian education system work?* Retrieved April 30, 2022, from <https://www.cdnsba.org/all-about>

Canadian Charter of Rights and Freedoms, Part 1 of the *Constitution Act*, 1982, being Schedule B to the Canada Act 1982 (UK), c 11.

Carter, I., Leslie, D., Leslie, D., Moore, S., & Moore, S. (2011). 24. Developing effective guidelines for faculty teaching first-year university students. *Collected Essays on Learning and Teaching*, 3, 146.

Cash, C.M., Cox, T.D., Hahs-Vaughn, D.L. (2020, June). Distance educators' attitudes and actions towards inclusive teaching practices. *Journal of the Scholarship of Teaching and Learning*, 21(2), 15-42.

Catalano, A. (2014). Improving distance education for students with special needs: A qualitative study of students' experiences with an online library research course. *Journal of Library & Information Services in Distance Learning*, 8(1-2), 17-31.

Center for Applied Special Technology. (n.d.-a). *About universal design for learning (UDL)*. Retrieved March 1, 2023, from <https://www.cast.org/impact/universal-design-for-learning-udl>

Center for Applied Special Technology. (n.d.-b). *Anne Meyer & David Rose Founders' Fund for Innovation, The*. Retrieved March 1, 2023, from <https://www.cast.org/get-involved/founders-fund-innovation>

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Center for Applied Special Technology. (n.d.-c). *David Gordon*. Retrieved March 1, 2023, from <https://www.cast.org/about/staff/david-gordon>

Center for Applied Special Technology. (n.d.-d). *Timeline of innovation*. Retrieved March 1, 2023, from <https://www.cast.org/impact/timeline-innovation>

Center for Applied Special Technology. (n.d.-e). *UDL on campus: Postsecondary institutions with UDL initiatives*. Retrieved March 1, 2023, from http://udloncampus.cast.org/page/udl_institutions

Center for Applied Special Technology (2018a). *UDL rising to equity*. <https://www.cast.org/our-work/accessibility-inclusive-technology>

Center for Applied Special Technology. (2018b). *Universal design for learning guidelines version 2.2*. <http://udlguidelines.cast.org>

Center for Applied Special Technology. (2018c). *UDL and the learning brain*. Wakefield, MA: Author. <http://www.cast.org/products-services/resources/2018/udl-learning-brain-neuroscience>

Center for Applied Special Technology. (2024). *About CAST*. <https://www.cast.org/about/about-cast>

Center for Universal Design, The. (2008). *About the Center: Ronald L. Mace*. <https://design.ncsu.edu/research/center-for-universal-design/>

Chandler, R., Zaloudek, J. A., & Carlson, K. (2017). How do you intentionally design to maximize success in the academically diverse classroom? *New Directions for Teaching and Learning*, 151, 151–169.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Chita-Tegmar, M., Gravel, J. W., Serpa, M., Domings, R., & Rose, D. (2012).

Using the universal design for learning framework to support culturally diverse learners. *Journal of Education*, 192(1), 17–22.

Cook, L., Rumrill, P. D., & Tankersley, M. (2009). Priorities and understanding of

faculty members regarding college students with disabilities. *International Journal of Teaching and Learning in Higher Education*, 21(1), 84–96.

Cooper, K., Marsolek, W., Riegelman, A., Farrell, S., & Kelly, J. (2019). Grey

literature: Use, creation, and citation habits of faculty researchers across disciplines. *Journal of Librarianship and Scholarly Communication*, 7(1), eP2314.

Couillard, E., & Higbee, J. (2018). Expanding the scope of universal design:

Implications for gender identity and sexual orientation. *Education Sciences*, 8(3), 147.

Cradler, J., McNabb, M., Freeman, M., & Burchett, R. (2002). How does

technology influence student learning? *Learning and Leading with Technology*, 29(8), 46–49, 56.

Dallas, B. K., Sprong, M. E., & Upton, T. D. (2013). Post-secondary faculty

attitudes toward inclusive teaching strategies. *Journal of Rehabilitation*, 79(1), 12–20.

Dalton, E. M., Lyner-Cleophas, M., Ferguson, B. T., & McKenzie, J. (2019).

Inclusion, universal design and universal design for learning in higher education: South Africa and the United States. *African Journal of Disability*, 8, 1–7.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Davies, P. L., Schelly, C. L., Spooner, C. L., & University, C. S. (2013).

Measuring the effectiveness of universal design for learning intervention in postsecondary education. *Journal of Postsecondary Education & Disability, 26*(3), 195–220.

Dell, C. A., Dell, T. F., & Blackwell, T. L. (2015). Applying universal design for learning in online courses: Pedagogical and practical considerations. *Journal of Educators Online, 12*(2), 166–192.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. D. C. Heath and Company.

Dinmore, S., & Stokes, J. (2015). Creating inclusive university curriculum: Implementing universal design for learning in an enabling program. *Widening Participation & Lifelong Learning, 17*(4), 4–19.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research, 133*, 285–296.

Dron, J. (2018). Smart learning environments, and not so smart learning environments: A systems view. *Smart Learning Environments, 5*, Article 25.

Dron, J., & Anderson, T. (2008). Lost in social space: Information retrieval issues in Web 1.5. *Journal of Digital Information*.

Dukes, L. L., Koorland, M. A., & Scott, S. S. (2009). Making blended instruction better: Integrating the principles of universal design for instruction into course design and delivery. *Action in Teacher Education, 31*(1), 38–48.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Edyburn, D. L. (2010). Would you recognize universal design for learning (UDL) if you saw it? Ten propositions for new directions for the second decade of UDL. *Learning Disability Quarterly*, 33(1), 33–41.
- Eitzen, A.M., Kinney, M.A. & Grillo, K.J. (2016, December). Changing the praxis of retention in higher education: A plan to teach all learners. *Change: The Magazine of Higher Learning*, 48(6).
- Elias, T. (2010). Universal instructional design principles for Moodle. *International Review of Research in Open & Distance Learning*, 11(2), 110–124.
- Farnsworth, V., Kleanthous, I. and WengerTrayner, E. (2016). Communities of practice as a social theory of learning: A conversation Etienne Wenger. *British Journal of Educational Studies*, 64(2), 139–160.
- Fermin-Gonzalez, M. (December, 2019). Research on virtual environments, inclusion, and diversity: A systematic review of scientific publications (2007-2017). *International Review of Research in Open and Distributed Learning*, 20(5), 146–167.
- Fidaldo, P., & Thormann, J. (2017). Reaching students in online courses using alternative formats. *International Review of Research in Open & Distance Learning*, 18(2), 139–161.
- Fleet, C., & Kondrashov, O. (2019). Universal design on university campuses: A literature review. *Exceptionality Education International*, 29(1), 136–148.
- Frederick, A. & Run, Y. (2019, March). The role of academic librarians in research data management: A case at Ghanaian university libraries. *Scientific Research*, 6(3), 1–16. doi:10.4236/oalib.1105286

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Freire, P. (1970). *Pedagogy of the oppressed* (Trans. M. Bergman Ramos). Continuum.

Gabby, L.T. & Shoham, S. (2017, December 4). The role of academic libraries in researching and teaching. *Sage Journals*, 51(3).

<https://doi.org/10.1177/096100061774246>

Goldkuhl, G. (2012). Pragmatism vs interpretivism in qualitative information systems research. *European Journal of Information Systems*, 21(2), 135–146.

Government of Canada. (2019, March 19). *Post-Secondary Institutions Strategic Investment Fund (SIF)*. <https://ised-isde.canada.ca/site/post-secondary-institutions-strategic-investment-fund/en>

Grant, C., & Osanloo, A. (2014). Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blueprint for your “house.” *Administrative Issues Journal: Connecting Education, Practice, and Research*, 4(2), 12–26.

Hall, T. E., Meyer, A., & Rose, D. H. (2012). *Universal design for learning in the classroom: Practical applications (What works for special-needs learners)*. The Guilford Press.

Hall, T., Strangman, N., & Meyer, A. (2003). *Differentiated instruction and implications for UDL implementation*. National Center on Accessing the General Curriculum.

Haug, P. (2017) Understanding inclusive education: Ideals and reality. *Scandinavian Journal of Disability Research*, 19(3), 206–217.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Hitch, D., Brown, P., Macfarlane, S., Watson, J., Dracup, M., & Anderson, K. (2019). The transition to higher education: Applying Universal Design for Learning to support student success. In S. Bracken & K. Novak (Eds.). *Transforming higher education through Universal Design for Learning: An international perspective* (pp. 84–99). Routledge.
- Houston, L. (2018). Efficient strategies for integrating universal design for learning in the online classroom. *Journal of Educators Online*, 15(3), 96–111.
- Individuals with Disabilities Act of 1997*, Pub. L. No. 105-17, U.S.C. (1997).
- Ingram, R., Lyons, B., Bowron, R., & Oliver, J. (2012). Higher education online course accessibility issues: universal design. *Review of Higher Education & Self-Learning*, 5(16), 143–154.
- Interaction Institute for Social Change. (2016). *Illustrating equity vs. equality*.
- Irvine, V. (2020). The landscapes of merging modalities. *EDUCAUSE Review*, 4, 41–58.
- JBI Scoping Review Methodology Group. (n.d.). *Resources: JBI Scoping Review Network*. University of Adelaide. Retrieved May 18, 2022, from <https://jbi.global/scoping-review-network/resources>
- Jenson, J. (2000, November). *Backgrounder: Thinking about marginalization: What, who, and why?* Canadian Policy Research Networks Inc.
- Jimenez, T. C., Graf, V. L., & Rose, R. (2007). Gaining access to general education: The promise of universal design for learning. *Issues in Teacher Education*, 16(2), 41–54.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Johnson, R. B., & Onwuegbuzie, A. J. (2015). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14–26.
- Khan, S., & Khusro, S. (2021). An insight into smartphone-based assistive solutions for visually impaired and blind people: Issues, challenges and opportunities. *Universal Access in the Information Society*, 20, 265–298.
- Kieran, L., & Anderson, C. (2019). Connecting universal design for learning with culturally responsive teaching. *Education and Urban Society*, 51(9), 1202–1216.
- Kim, E., & Aquino, K. C. (Eds.). (2017). *Disability as diversity in higher education: Policies and practices to enhance student success*. Routledge Taylor and Francis Group.
- King, L., Jorgensen, M., Lussier, A. Fichten, C., Havel, Alice, Amsel, R., Poldma, T., Budd, J., Jorgensen, S., Marcil, E. Nguyen, M. N., Chauvin, A., & Asuncion, J. (2017). *Student and professor perspectives on exemplary practices in the use of information and communication technologies (ICTs) and e-learning in colleges* (Modified version of report for the Fonds de recherche du Quebec – Société et culture and the ministere de l'Education et de l'Enseignement superieur). Reseau de Recherche Adaptech.
- King-Sears, M. (2009, September). Universal design for learning: Technology and pedagogy. *Learning Disability Quarterly*, 32, 199–200.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- King-Sears, M.E., Stefanidis, A., Evmenova, A., Rao, K., Mergen, R.L., Owen, L.S. & Strimel, M.M. (2023). Achievement of learners receiving UDL instruction: A meta-analysis. *Teaching and Teacher Education*, 122(103956), 1–15.
- Kivunja, C., & Kuyini, A. B. (2017). Understanding and applying research paradigms in educational contexts. *International Journal of Higher Education*, 5(5), 26–41.
- Koro-Ljungberg, M., Yendol-Hoppey, D., Smith, J. J., & Hayes, S. B. (2009). (E)pistemological awareness, instantiation of methods, and uninformed methodological ambiguity in qualitative research projects. *Educational Researcher*, 38(9), 687–699.
- Kraglund-Gauthier, W. L., Young, D. C., & Kell, E. (2014, November). Differentiation, universal design for learning, and technology. *Transformative Dialogues: Teaching & Learning Journal*, 7(3), 1–9.
- Kumar, K. L., & Wideman, M. (2014). Accessible by design: Applying UDL principles in a first-year undergraduate course. *Canadian Journal of Higher Education*, 44(1), 125–147.
- Lau, S.-T., Nirmalanathan, K., Khan, M., Gauthier, C., Maisel, J., & Novak, A. (2020). *A Canadian roadmap for accessibility standards*. Canadian Standards Association.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Lebeničnik, M., Pitt, I., & Istenič Starčič, A. (2015). Use of online learning resources in the development of learning environments at the intersection of formal and informal learning: The student as autonomous designer. *Center for Educational Policy Studies Journal*, 5(2), 95–113.
- Lohmann, M. J., Boothe, K. A., Hathcote, A. R., & Turpin, A. (2018). Engaging graduate students in the online learning environment: A universal design for learning (UDL) approach to teacher preparation. *Networks: An Online Journal for Teacher Research*, 20(2).
- Love, M. L., Baker, J. N., & Devine, S. (2019). Universal design for learning: Supporting college inclusion for students with intellectual disabilities. *Career Development and Transition for Exceptional Individuals*, 42(2), 122–127
- Mt. San Antonio College. (2024, January 3). *Prominence of Mobile Technology & Apps*.
- Maboloc, C. R. (2021, January 23). Deep thinking or resistance? On finding a middle ground between Paolo Freire's critical pedagogy and John Dewey's pragmatism. *Philosophia*, 49, 1097–1108.
- Maxwell, J. (2004). Causal explanation, qualitative research, and scientific inquiry in education. *Educational Researcher*, 33(2), 3–11.
- McGuire, J. M. (2014). Universally accessible instruction: Oxymoron or opportunity? *Journal of Postsecondary Education & Disability*, 27(4), 387–398.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

McMahon, D. D., & Walker, Z. (2019). Leveraging emerging technology to design an inclusive future with universal design for learning. *Center for*

Educational Policy Studies Journal, 9(3), 75–93.

Merriam-Webster. (n.d.). Egalitarianism. *Merriam-Webster.com dictionary*.

McKenzie, L. (2019a). ADA lawsuit prompts institutional change, draws more

students. In N. J. Evans, E. M. Broido, K. R. Brown, & A. K. Wilke (Eds.),

New accessibility: Students disabilities and access to technology (pp. 24–26). Inside Higher Education.

McKenzie, L. (2019b). Legal battle over captioning continues. In N. J. Evans, E.

M. Broido, K. R. Brown, & A. K. Wilke (Eds.), *New accessibility: Students*

disabilities and access to technology (pp. 19–20). Inside Higher

Education.

McKenzie, L. (2019c). The digital courseware accessibility problem. In N. J.

Evans, E. M. Broido, K. R. Brown, & A. K. Wilke (Eds.), *New accessibility:*

Students' disabilities and access to technology (pp. 5–7). Inside Higher

Education.

Meyer, A., Rose, D. H., & Gordon, D. (2014). *Universal design for learning:*

Theory and practice. CAST Professional Publishing.

Mihal, A. (2017). The right to inclusive education. *Equal Opportunities for All*.

Editura Universitaria Craiova, 53, 125–134.

Milken Institute School of Public Health. (2020, November 5). *Equity vs. equality:*

What's the difference? GW Public Health Online Public Health.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Mlaba, K. (2021, March 19). Equity vs equality: What's the difference? *Global Citizen*.

Moon, K., & Blackman, D. (2014). A guide to understanding social science research for natural scientists. *Conservation Biology*, 28, 1167–1177.

Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1(1), 48–76.

Morra, T., & Reynolds, J. (2010). Universal design for learning: Application for technology-enhanced learning. *Inquiry*, 15(1), 43–51.

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, 18, Article 143.

National Center on Assessing the General Curriculum. (n.d.). *The UDL guidelines checklist*.

National Center for Universal Design for Learning. (2021). *DO-IT: Disabilities, opportunities, internetworking, and technology*. University of Washington.

National Educational Association of Disabled Students. (2006a). *Jennison Asuncion biography*.

National Educational Association of Disabled Students. (2006b). *2006 National Conference: Creating our future: On campus and beyond, November 10-12*.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

National Research Council. (2000). *How people learn: Brain, mind, experience, and school* (Expanded ed.). National Academic Press.

National Society of High School Scholars. (2021, May 11). *Equity vs equality in education: Why both are essential in today's classrooms* [Blog].

<https://www.nshss.org/resources/blog/blog-posts/equity-vs-equality-in-education-why-both-are-essential-in-today-s-classrooms/#:~:text=Equality%20in%20education%20is%20necessary,need%20extra%20help%20and%20attention.>

Nieves, L. H., Moya, E. C., & Soldado, R. M. (2019). A MOOC on universal design for learning designed based on the UDL paradigm. *Australasian Journal of Educational Technology*, 35(6), 30–47.

Novak, K., & Thibodeau, T. (2016). *UDL in the CLOUD: How to design and deliver online education using universal design for learning* (Kindle ed.). Available from Amazon.ca

Novak, K. (2016). *UDL now! A teacher's guide to applying universal design for learning in today's classrooms* (Kindle ed.). CAST Professional Publishing. Available from Amazon.ca

Novak, K. (2021, March 21). If equity is a priority, then UDL is a must. *Cult of Pedagogy*.

Novak, K. (2023, October 17). *AI for UDL: A review of the AI Tool Ludia*. Novakeducation.com

O'Sullivan, J. O. (2016). *UDL technology: Technology for universal design for learning and special education* (Kindle ed.). Self-published.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- O'Sullivan, J. O. (2018, April). *Presentation: Creative technology for inclusion and engagement. center on technology and disability* [Video]. YouTube. <https://www.youtube.com/watch?v=bBHbGkoHN2c>
- Oliver, S., Rees, R., Clarke-Jones, L., Milne, R. Oakley, A. R., Gabbay, J., Stein, K., Buchanan, P., & Gyte, G. (2008). A multidimensional conceptual framework for analysing public involvement in health services research. *Health Expectations, 11*, 72–84.
- Pace, D. A., & Blue, E. V. (2016). Meeting the international need for special educators with online education. *Journal of the International Association of Special Education, 16*(1), 100–108.
- People with Disability Australia. (2023). *Social model of disability*.
- Peters, C. O., & Bradbard, D. A. (2010). Web accessibility: An introduction and ethical implications. *Journal of Information Communication and Ethics in Society, 8*(2), 206–232.
- Peters, M. D. J., Godfrey, C., Khali, H., Mclerney, P., Parker, D., & Baldini-Soares, C. (2015). Guidance for conducting systematic scoping reviews. *International Journal of Evidence-Based Healthcare, 13*(3), 141–146.
- Pliner, S. M., & Johnson, J. R. (2004). Historical, theoretical, and foundational principles of universal instructional design in higher education. *Equity & Excellence in Education, 37*, 105–113.
- Pousson, J., & Myers, K. (2018). Ignatian pedagogy as a frame for universal design in college: Meeting learning needs of generation Z. *Education Sciences, 8*(4), 193.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- PRISMA. (2021). *Extensions and scoping reviews. Transparent reporting of systematic reviews and meta-analysis*. Retrieved on April 30, 2022 from <http://www.prisma-statement.org/Extensions/ScopingReviews?AspxAutoDetectCookieSupport=1>
- Rappolt-Schlichtmann, G., Daley, S. G., & Rose, L.T., Eds. (2012). *A research reader in universal design for learning*. Harvard Education Press.
- Rao, K., & Tanners, D. (2011). Curb cuts in cyberspace: Universal instructional design for online courses. *Journal of Postsecondary Education and Disability*, 24(3), 211–229.
- Repasky, C. (2023, August 21). *The power of web accessibility*. ReciteMe.
- Roberts, K. D., Park, J. H., Brown, S., & Cook, B. (2011). Universal design of instruction in postsecondary education: A systematic review of empirically based articles. *Journal of Postsecondary Education and Disability*, 24(1), 5–15.
- Robinson, D. E., & Wizer, D. R. (2016). Universal design for learning and the quality matters guidelines for the design and implementation of online learning events. *International Journal of Technology in Teaching & Learning*, 12(1), 17–32.
- Rogers-Shaw, C., Carr-Chellman, D. J., & Choi, J. (2018). Universal design for learning: Guidelines for accessible online instruction. *Adult Learning*, 29(1), 20–31.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Rose, D. H., Gravel, J. W., & Domings, Y. M. (2010). *UDL unplugged: The role of technology in UDL*. CAST Publication.
- Sapp, W. (2009). Universal design: Online educational media for students with disabilities. *Journal of Visual Impairment & Blindness*, 103(8), 495–500.
- Scheer, A, Noweski, C., & Meinel, C. (2012). Transforming constructivist learning into action. *Design and Technology Education: An International Journal*, 17(3), 8–19.
- Schelly, C. L., Davies, P. L., & Spooner, C. L. (2011). Student perceptions of faculty implementation of universal design for learning. *Journal of Postsecondary Education and Disability*, 24(1), 17–30.
- Schleicher, A. (2020). *The impact of Covid-19 on education: Insights from Education at a Glance 2020*. OECD
- Scott, L. A., Temple, P., & Marshall, D. (2015). UDL in online college coursework: Insights of infusion and educator preparedness. *Online Learning*, 19(5), 99–119.
- Seale, J. K. (2014). *E-learning and disability in higher education: Accessibility research and practice* (2nd ed.). Routledge.
- Shi, T. (2020). Neuroscience informed pedagogy with UDL principles for quality instructional design. In W. Kilgore & D. Weaver (Eds). *Connecting the dots: Improving student outcomes and experiences with exceptional instructional design. Quality matters in the design of learning experiences*. University of Regina.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Singleton, K., Evmenova, A., Jerome, M. K., & Clark, K. (2019). Integrating UDL strategies into the online course development process: Instructional designers' perspectives. *Online Learning, 23*(1), 206–235.
- Smith, F. (2012). Analyzing a college course that adheres to the universal design for learning (UDL) framework. *Journal for the Scholarship of Teaching and Learning, 12*(3), 31–61.
- Spellman, J., Bradley Montgomery, R., Lauriat, S., & Cooper, M. (Eds.). (2021, December 7). *W3C accessibility guidelines (WCAG) 3.0*.
<https://www.w3.org/TR/2021/WD-wcag-3.0-20210121/>
- Sucharew, H., & Macaluso, M. (2019). Methods for research evidence synthesis: The scoping review approach. *Journal of Hospital Medicine, 14*(7), 416–418.
- Takacs, S., Zhang, J., Lee, H. (2020). *Universal Design for Learning: Strategies for blended and online learning*. Centre for Teaching, Learning, and Innovation. Justice Institute of British Columbia
- Tate, K., Fallon, K. M., Casquarelli, E. J., & Marks, L. R. (2014). Opportunities for action: Traditionally marginalized populations and the economic crisis. *The Professional Counselor, 4*(4), 285–302.
- Tenopir, C. Sandusky, R.J., Allard, S. & Birch, B. (2013, March 25). Academic librarians and research data services; preparation and attitudes. *Sage Journals, 39*(1), 70–78. [↓](#)

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Thomson, R., Fichten C., Budd, J., Havel, A., & Asuncion, J. (2015). Blending universal design, e-learning, and information and communication technologies. In S. E. Burgstahler (Ed). *Universal design in higher education: From principles to practice* (2nd ed., pp. 275–284). Harvard Education Press.
- Thomson, R., Fichten, C., Havel, A., Budd, J., & Asuncion, J. (2017, February). Tips for using UD and ICTs to create inclusive learning. *Newsroom, Dawson College*.
- Tinto, V. (2012). Enhancing student success: Taking the classroom success seriously. *The International Journal of the First Year in Higher Education*, 3(1), 1–8.
- Tinto, V. (2017). Reflections on student persistence. *Student Success*, 8(2), 1–8.
- Tobin, T. (2014). Increase online student retention with universal design for learning. *The Quarterly Review of Distance Education*, 15(3), 13–24.
- Tobin, T. (2018, October 14). *Re-framing UDL for broader adoption in higher education*. Presentation Paper. 2018 AHEAD Equity and Excellence Conference. Albuquerque, New Mexico, July 16–20, 2018. University of Wisconsin-Madison.
- Tobin, T. (2019, July 25). Reaching all learners through their phones and universal design for learning. *Journal of Adult Learning, Knowledge and Innovation*, 4(1), 9–19.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners* (2nd ed.). Association for Supervision & Curriculum

Development.

Treviranus, J., Roberts, V. (2006). Inclusive E-learning. In J. Weiss, J. Nolan, J.

Hunsinger, & P. Trifonas (Eds) *The international handbook of virtual*

learning environments. Springer, Dordrecht.

Treviranus, J., Stolarick, K., Denstedt, M., Fichten, C., & Ascunsion, J. (2010).

Leveraging inclusion and diversity as Canada's digital

advantage. Discussion Paper. Inclusive Design Research Centre.

(Unpublished). Available at

https://openresearch.ocadu.ca/id/eprint/1476/1/Treviranus_Inclusion_2010.pdf

United Nations, Department of Economic and Social Affairs Disability. (2006).

Convention on the rights of persons with disabilities: Article 9.

University of British Columbia. (2021, August 18). *Indigenous research*

methodologies.

U.S. Department of Education. (2011, March). *The Individuals with Disabilities*

Education Act: Provisions related to children with disabilities enrolled by

their parents in private schools.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- U.S. Department of Education. (2022, May 6). *US Department of Education announces intent to strengthen and protect rights for students with disabilities by amending regulations implementing section 504* [Press release]. <https://www.ed.gov/news/press-releases/us-department-education-announces-intent-strengthen-and-protect-rights-students-disabilities-amending-regulations-implementing-section-504#:~:text=Forty%2Dfive%20years%20after%20publication,and%20protect%20the%20rights%20of>
- University of Delaware. (2016). *Diversity and equity in learning*. Center for Teaching and Assessment of Learning.
- Vankatesh, K. (2015). *Universal design for learning as a framework for social justice: A multi-case analysis of undergraduate pre-service teachers* [Doctoral dissertation, Boston College].
- Watt, S., Vajoczki, S., Voros, G., Vine, M. M., Fenton, N., & Tarkowski, J. (2014). Lecture capture: An effective tool for universal instructional design? *Canadian Journal of Higher Education*, 44(2), 1–29.
- WebAIM. (n.d.). *WAVE web accessibility evaluation tool*. Retrieved April 30, 2022, from <https://wave.webaim.org/help>
- WebAIM. (2020, April 14). *Introduction to web accessibility*. <https://webaim.org/intro/>
- Weiss, W. (2021, October 17). The costs of marginalizing people with disabilities. *Disabled World*.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Wenger, E. McDermott, R. & Snyder, W. M. (2002, March 25). *Cultivating communities of practice: A guide to managing knowledge*. Harvard Business School.
- Williams, J., Rice, R., Lauren, B., Morrison, S., Van Winkle, K., & Elliott, T. (2013). Problem-based universal design for learning in technical communication and rhetoric instruction. *Journal of Problem Based Learning in Higher Education*, 1(1), 247–261.
- Woods, A., & Leahy, M. (2019). Using digital technologies to support inclusion in the mainstream classroom. *Reach*, 32(2), 102–124.
- Wynants, S. A., & Dennis, J. M. (2017). Embracing diversity and accessibility: A mixed methods study of the Impact of an online disability awareness program. *Journal of Postsecondary Education & Disability*, 30(1), 33–48.
- Yuan, H., Rippetoe, J., Ding, L. West, S.G. Kang, Z., Shebab, R.L. (2017). *Universal Design for Learning in the framework of neuroscience-based education and neuroimaging-based assessment*. IEEE.
- Zwacker-Richter, Alturki, U., & Aldraiweesh, A. (2017). *Review and content analysis of the international review of research in open and distance/distributed learning (2000-2015)*. International Review of Research in Open and Distributed Learning.

Appendix: Reference List from Data Collection

- Abell, M. (2006). Individualizing Learning Using Intelligent Technology and Universally Designed Curriculum. *The Journal of Technology, Learning, and Assessment*, 5(3).
- Al-Azawei, A., Serenelli, F., & Lundquist, K. (2016). Universal design for learning (UDL): A content analysis of peer-reviewed journal papers from 2012-2015. *Journal of Scholarship of Teaching and Learning*, 16(3), 39–56.
- Baiyun Chen, Bastedo, K., & Howard, W. (2018). Exploring design elements for online STEM courses: Active learning, engagement & assessment design. *Online Learning*, 22(2), 59–75..
- Banfield-Hardaway, S. (2010). Universal instructional design: Tools for creating an inclusive educational experience. *Vermont Connection*, 31, 21–28.
- Basham, J. D., Lowrey, K. A., & deNoyelles, A. (2010). Computer mediated communication in the universal design for learning framework for preparation of special education teachers. *Journal of Special Education Technology*, 25(2), 31–44
- Bastedo, K., Sugar, A., Swenson, N., & Vargas, J. (2013). Programmatic, systematic, automatic: An online course accessibility support model. *Journal of Asynchronous Learning Networks*, 17(3), 87–101.
- Behling, K. (2017). Accessibility considerations for hybrid courses. *New Directions for Teaching & Learning*, 2017(149), 89–101.
- Berger, Joseph B., & Thanh, D. (2004). Leading organizations for universal design. *Equity & Excellence in Education*, 37(2), 124–134.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Bernacchio, C., Ross, F., Washburn, K., Whitney, J., & Wood, Diane R. (2007).

Faculty collaboration to improve equity, access, and inclusion in higher education. *Equity & Excellence in Education*, 40(1), 56–66.

Black, D. R., Weinberg, L. A., & Brodwin, M. G. (2015). Universal design for learning and instruction: Perspectives of students with disabilities in higher education. *Exceptionality Education International*, 25(2), 1–26.

Bonneau, D. (2012). Web-based teaching, learning, and disabilities: An overview of the literature, 2005-2010. *Global Education Journal*, 1, 115–121.

Boothe, K. A., Lohmann, M. J., Donnell, K. A., & Hall, D. D. (2018). Applying the principles of universal design for learning (UDL) in the college classroom. *Journal of Special Education Apprenticeship*, 7(3).

Boothe, K. A., Lohmann, M. J., & Owiny, R. (2020). Enhancing student learning in the online instructional environment through the use of universal design for learning. *Networks: An Online Journal for Teacher Research*, 22(1).

Burgstahler, S., & Russo-Gleicher, (Rose) Rosalie J. (2015). Applying universal design to address the needs of postsecondary students on the autism spectrum. *Journal of Postsecondary Education & Disability*, 28(2), 199–212

Carter, I., Leslie, D., & Kwan, D. (2012). 21. Applying universal instructional design to course websites by using course evaluations. *Collected Essays on Learning and Teaching*, 5, 119

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Carter, I., Leslie, D., Leslie, D., Moore, S., & Moore, S. (2011). 24. Developing effective guidelines for faculty teaching first-year university students. *Collected Essays on Learning and Teaching*, 3, 146.
- Cash, C. M., Cox, T. D., & Hahs-Vaughn, D. L. (2020). Distancee Educators attitudes and actions towards inclusive teaching practices. *Journal of the Scholarship of Teaching and Learning*, 21(2), 15–42.
- Catalano, A. (2014). Improving distance education for students with special needs: A qualitative study of students' experiences with an online library research course. *Journal of Library & Information Services in Distance Learning*, 8(1–2), 17–31.
- Chandler, R., Zaloudek, J. A., & Carlson, K. (2017). How do you intentionally design to maximize success in the academically diverse classroom? *New Directions for Teaching and Learning*, 151, 151–169.
- Chodock, T., & Dolinger, E. (2009). Applying universal design to information literacy: teaching Sstudents who learn differently at Landmark College. *Reference & User Services Quarterly*, 49(1), 24–32.
- Cook, L., Rumrill, P. D., & Tankersley, M. (2009). Priorities and understanding of faculty members regarding college students with disabilities. *International Journal of Teaching and Learning in Higher Education*, 21(1), 84–96.
- Couillard, E., & Higbee, J. (2018). Expanding the scope of universal design: implications for gender identity and sexual orientation. *Education Sciences*, 8(3), 147.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Coy, K. (2016). Post-secondary educators can increase educational reach with universal design for learning. *Educational Renaissance*, 5(1), 27–36. eric.
- Dallas, B. K., Sprong, M. E., & Upton, T. D. (2013). Post-secondary faculty attitudes toward inclusive teaching strategies. *Journal of Rehabilitation*, 79(1), 12–20.
- Dalton, E. M., Lyner-Cleophas, M., Ferguson, B. T., & McKenzie, J. (2019). Inclusion, universal design and universal design for learning in higher education: South Africa and the United States. *African Journal of Disability*, 8, 1–7.
- David Black, R., Weinberg, L. A., & Brodwin, M. G. (2014). Universal design for instruction and learning: A pilot study of faculty instructional methods and attitudes related to students with disabilities in higher education. *Exceptionality Education International*, 24(1), 48–64.
- Davies, P. L., Schelly, C. L., Spooner, C. L., & University, C. S. (2013). Measuring the effectiveness of universal design for learning intervention in postsecondary education. *Journal of Postsecondary Education & Disability*, 26(3), 195–220.
- Dell, C. A., Dell, T. F., & Blackwell, T. L. (2015). Applying universal design for learning in online courses: Pedagogical and practical considerations. *Journal of Educators Online*, 12(2), 166–192.
- Dinmore, S., & Stokes, J. (2015). Creating inclusive university curriculum: Implementing universal design for learning in an enabling program. *Widening Participation & Lifelong Learning*, 17(4), 4–19

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Dukes, L. L., Koorland, M. A., & Scott, S. S. (2009). Making blended instruction better: Integrating the principles of universal design for instruction into course design and delivery. *Action in Teacher Education, 31*(1), 38–48.
- Elias, T. (2010). Universal instructional design principles for moodle. *International Review of Research in Open & Distance Learning, 11*(2), 110–124.
- Fichten, C. S., Heiman, T., Havel, A., Jorgensen, M., Budd, J., & King, L. (2016). Sustainability of disability-related services in Canada and Israel: Will the real universal design please stand up? *Exceptionality Education International, 26*(1), 19–35.
- Fidaldo, P., & Thormann, J. (2017). Reaching students in online courses using alternative formats. *International Review of Research in Open & Distance Learning, 18*(2), 139–161.
- Fleet, C., & Kondrashov, O. (2019). Universal design on university campuses: A literature review. *Exceptionality Education International, 29*(1), 136–148.
- Hays, L., & Handler, K. (2020). Good design is universal: Using universal design principles to promote self-regulated learning in learning management systems when teaching information literacy. *Journal of Library & Information Services in Distance Learning, 14*(2), 127–140.
- Houston, L. (2018). Efficient strategies for integrating universal design for learning in the online classroom. *Journal of Educators Online, 15*(3), 96–111.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Ingram, R., Lyons, B., Bowron, R., & Oliver, J. (2012). Higher education online course accessibility issues: universal design. *Review of Higher Education & Self-Learning, 5*(16), 143–154.
- Kearns, L. R., Frey, B. A., & McMorland, G. (2013). Designing online courses for screen reader users. *Journal of Asynchronous Learning Networks, 17*(3), 73–85.
- Kumar, K. L., & Wideman, M. (2014). Accessible by design: Applying UDL principles in a first year undergraduate course. *Canadian Journal of Higher Education, 44*(1), 125–147.
- Lebeničnik, M., Pitt, I., & Istenič Starčič, A. (2015). Use of online learning resources in the development of learning environments at the intersection of formal and informal learning: The student as autonomous designer. *Center for Educational Policy Studies Journal, 5*(2), 95–113.
- Lohmann, M. J., Boothe, K. A., Hathcote, A. R., & Turpin, A. (2018). Engaging graduate students in the online learning environment: A universal design for learning (UDL) approach to teacher preparation. *Networks: An Online Journal for Teacher Research, 20*(2).
- Love, M. L., Baker, J. N., & Devine, S. (2019). Universal design for learning: supporting college inclusion for students with intellectual disabilities. *Career Development and Transition for Exceptional Individuals, 42*(2), 122–127.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- McGuire, J. M. (2014). Universally accessible instruction: Oxymoron or opportunity? *Journal of Postsecondary Education & Disability*, 27(4), 387–398.
- McMahon, D. D., & Walker, Z. (2019). Leveraging emerging technology to design an inclusive future with universal design for learning. *Center for Educational Policy Studies Journal*, 9(3), 75–93.
- Moorefield-Lang, H. (2019). Accessibility in online course design. *Library Technology Reports*, 55(4), 14–16.
- Morra, T., & Reynolds, J. (2010). Universal design for learning: Application for technology-enhanced learning. *Inquiry*, 15(1), 43–51.
- Nieves, L. H., Moya, E. C., & Soldado, R. M. (2019). A MOOC on universal design for learning designed based on the UDL paradigm. *Australasian Journal of Educational Technology*, 35(6), 30–47.
- Pace, D. A., & Blue, E. V. (2016). Meeting the international need for special educators with online education. *Journal of the International Association of Special Education*, 16(1), 100–108.
- Parra, J., Osanloo, A., & Raynor, C. (2018). Perspectives on a graduate online course that modeled universal design for learning (UDL) to teach UDL. *The Asian Society of Distance Education*. 13(1), 59–87.
- Peuler, M., & Coltrain, M. (2020). Flip this house!: Updating and designing an online first year seminar module series. *Journal of Library & Information Services in Distance Learning*, 14(3–4), 253–265.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Pousson, J., & Myers, K. (2018). Ignatian pedagogy as a frame for universal design in college: Meeting learning needs of generation Z. *Education Sciences, 8*(4), 193.
- Rao, K., Edelen-Smith, P., & Wailehua, C.-U. (2015). Universal design for online courses: Applying principles to pedagogy. *Open Learning, 30*(1), 35–52.
- Rao, K., & Tanners, A. (2011). Curb cuts in cyberspace: Universal instructional design for online courses. *Journal of Postsecondary Education & Disability, 24*(3), 211–229.
- Robinson, D. E., & Wizer, D. R. (2016). Universal design for learning and the quality matters guidelines for the design and implementation of online learning events. *International Journal of Technology in Teaching & Learning, 12*(1), 17–32. ehh.
- Rogers-Shaw, C., Carr-Chellman, D. J., & Choi, J. (2018). Universal design for learning: Guidelines for accessible online instruction. *Adult Learning, 29*(1), 20–31.
- Sapp, W. (2009). Universal design: Online educational media for students with disabilities. *Journal of Visual Impairment & Blindness, 103*(8), 495–500.
- Scott, L. A., Temple, P., & Marshall, D. (2015). UDL in online college coursework: Insights of infusion and educator preparedness. *Online Learning, 19*(5), 99–119.
- Selvester, P. M., Mulholland, R., & Wong, P. (2006). Camtasia: A tool for universal design learning. *College & University Media Review, 12*(2), 9–17.

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

- Simoncelli, A., & Hinson, J. M. (2008). College students' with learning disabilities personal reactions to online learning. *Journal of College Reading & Learning*, 38(2), 49–62.
- Singleton, K., Evmenova, A., Jerome, M. K., & Clark, K. (2019). Integrating UDL strategies into the online course development process: Instructional designers' perspectives. *Online Learning*, 23(1), 206–235.
- Southall, C. (2013). Use of technology to accommodate differences associated with autism spectrum disorder in the general curriculum and environment. *Journal of Special Education Technology*, 28(1), 23–34.
- Tobin, T. J. (2014). Increase online student retention with universal design for learning. *Quarterly Review of Distance Education*, 15(3), 13–24.
- Watt, S., Vajoczki, S., Voros, G., Vine, M. M., Fenton, N., & Tarkowski, J. (2014). Lecture capture: An effective tool for universal instructional design? *Canadian Journal of Higher Education*, 44(2), 1–29.
- Webb, K. K., & Hoover, J. (2015). Universal design for learning (UDL) in the academic library: A methodology for mapping multiple means of representation in library tutorials. *College & Research Libraries*, 76(4), 537–553. eric.
- Wells, M.B. (2022). Student perspectives on the of universal design for learning in virtual formats in higher education. *Smart Learning Environments*. 37(2022).

SCOPING REVIEW OF INCLUSIVE OHE: LEVERAGING UDL PRACTICES

Williams, J., Rice, R., Lauren, B., Morrison, S., Van Winkle, K., & Elliott, T.

(2013). Problem-based universal design for learning in technical communication and rhetoric instruction. *Journal of Problem Based Learning in Higher Education*, 1(1), 247–261.

Woods, A., & Leahy, M. (2019). Using digital technologies to support inclusion in the mainstream classroom. *Reach*, 32(2), 102–124.

Wynants, S. A., & Dennis, J. M. (2017). Embracing diversity and accessibility: A mixed methods study of the Impact of an online disability awareness program. *Journal of Postsecondary Education & Disability*, 30(1), 33–48.