AHEAD Accessing Higher Ground Presentation Paper

Title: "Re-Framing UDL for Broader Adoption in Higher Education"
Run Title: "UDL and Mobile Learners"
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Submit Date: 14 October 2018

ABSTRACT

To help make educational materials and practices inclusive and useful for all learners, this presentation paper

- provides the history of the Universal Design for Learning (UDL) framework,
- defines it in its educational context,
- shows how it has been adopted in K-12 and higher education institutions across North America,
- re-frames UDL as a strategy for reaching adult learners on their mobile devices, and
- radically reflects on how faculty members and course designers can adopt UDL in order to create learning interactions that provide students with more time for study and practice in their busy days.

To this end, I argue that we should broaden our course-access-design focus away from learners with disabilities and toward a larger ease-of-use/general-inclusion framework. By reading this presentation paper, you will be able to

- help your faculty colleagues to incorporate Universal Design for Learning (UDL) elements into their courses,
- design/retrofit existing course components using UDL principles,
- expand your institution's use of UDL elements beyond the legally-required minimum.

This presentation paper posits diversity in its most inclusive form: instead of relying solely on providing accommodation services to learners with disabilities—which is most often a last-minute, ad-hoc, reactive process—adopting UDL as part of an institution's culture of course design, teaching practices, and support services allows all learners to benefit, regardless of their place on the ability spectrum.

KEYWORDS

THE ROOTS OF UNIVERSAL DESIGN FOR LEARNING (UDL)

In architecture, Universal Design is "the design of products, environments, and communication to be usable by all people, to the greatest extent possible, without adaptation or specialized design" (Institute for Human Centered Design, 2017). Imagine that you are moving in to a new house. The three steps leading to the front door will present a barrier to your elderly neighbor visiting with a welcome-to-the-neighborhood gift, to your daughter bringing your grandson over in his stroller, and to you, when you are carrying in your couch. Design the house to be universally accessible from the beginning, however, and you create a welcoming space for all.

We can trace the formal concept of UD back to architect Ron Mace (Schwab, 2015). Mace had polio as a child and used a wheelchair to get around. He recognized in the 1950s that the U.S. population was aging. He foresaw that people who were no longer able to navigate stairs or small bathrooms would have to move out of their unusable homes and into nursing facilities or the homes of relatives. Mace believed that if architects designed homes to be "usable by everyone to the greatest extent possible" from the beginning, then more people could continue to stay at home as they aged (Gaylord et al., 2004). The fundamental idea of extending such barrier-free environments to everyone was introduced in the United States partly through the 1968 Architectural Barriers Act.

The concept of Universal Design makes intuitive sense. Designing supermarkets to have sliding doors with electronic sensors allows more people to enter and exit the store with ease: people pushing shopping carts as well as people in wheelchairs alike. By adding audio signals to traffic intersections, more people can cross safely: those who are guided by the visual walk signals and those paying attention to the audio chirp alike. By adding closed captions to television programs, more people can enjoy them: viewers who are learning the language, who want to keep up with unfamiliar accents, or who have hearing impairments. All of these design elements in the built environment are simple, unobtrusive, and make our lives easier. We may not even think of them as originating to support a certain group of people—people with physical disabilities.

And yet, if you ask scholars where these affordances come from, most will point to Universal Design, specifically as it applies to barrier-free living. In North America, the 1950s saw the beginning of the de-institutionalization movement. People with disabilities were removed from institutions and placed into inclusive community-based settings. Architects and city planners began examining how to make such transitions more successful for people with physical disabilities. This movement also coincided with the U.S. civil-rights movement, also motivated by equality. The civil rights of people with disabilities then became an action item for U.S. lawmakers, who, with Section 504 of the Rehabilitation Act of 1973, included physical access to public spaces as a condition for receiving federal financial assistance.

This civil-rights movement was extended in 1988 with the Fair Housing Act, which requires builders to ensure that people with disabilities can get physical access to multi-family housing. The Americans with Disability Act (ADA) of 1990 took the initiative further when it required both public and private entities to ensure equal access to their physical space, regardless of whether they received federal funding. Suddenly, this meant that any public places people went (out to eat, shopping, libraries, parks, theaters, museums) must be accessible.

As the United States progressed in its efforts to ensure equal access to the built environment, disability-rights advocates began raising awareness that telecommunication was also not accessible. Shortly after the ADA was signed into law, Congress amended Section 508 of the Rehabilitation Act to include all communication and information technology. This meant that phone lines, television shows, movies, the Internet, and information kiosks must be accessible. This extension of UD principles from the physical environment to the digital one was a major step toward the eventual creation of Universal Design for Learning (UDL).

In short, Universal Design became a mental framework that supports the civil rights of all American citizens. It reduces the need for people with disabilities to have to ask for special treatment through accommodations (making one change, one time, for one person), instead promoting a more holistic existence through UD that is aimed at making life easier for everyone.

The work that Ron Mace initiated continues today at the Center for Universal Design at North Carolina State University. The Center for UD developed seven principles to guide the designs of environments, products, and communications.

Principle	Definition
Equitable Use	The design is useful and marketable to people with diverse abilities.
Flexibility in Use	The design accommodates a wide range of individual preferences and abilities.
Simple and Intuitive	Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
Perceptible Information	The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
Tolerance for Error	The design minimizes hazards and the adverse consequences of accidental or unintended actions.
Low Physical Effort	The design can be used efficiently and comfortably and with a minimum of fatigue.
Size and Space for Approach and Use	Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

(Connell, et al., 1997)

Over the years, these principles have guided architects and designers in the work they do, while also uniting people with various needs through equal access.

Universal Design for Learning started in elementary and secondary education

The transition from UD in the built world to Universal Design for Learning in the sphere of educational interactions was a gradual one that started in the K-12 world. If students cannot get access to school buildings, then they are at a disadvantage compared to their peers. Likewise, if students cannot participate in the curriculum or methods of instruction being used, then they are also at a disadvantage. Universal Design for Learning examines what happens once students get through those school doors. How can we remove the barriers in the learning environment?

UDL began in the early 1990s, when David Rose and his colleagues at the Center for Applied Special Technology (CAST) argued that UDL "puts the tag 'disabled' where it belongs—on the curriculum, not the learner. The curriculum is disabled when it does not meet

the needs of diverse learners" (Council for Exceptional Children, 2011). The scientists at CAST incorporated neuroscience into the mindset of UDL, extending the UD principles that had been created to guide the design of things (e.g., buildings, products) out into the design of social interactions (e.g., human learning environments).

In the 1990s, CAST began by examining the diversity and academic success of students in U.S. public elementary and secondary schools. Was it an indication of students' ability when some seemed unable to pay attention to their teachers after fifteen minutes of lecturing? Were students whose first language was not English being punished unfairly because they couldn't take notes fast enough? Why were students who did not have access to computers weaker than their peers on writing concepts? CAST looked holistically at student demographics, methods of instruction, and curriculum design, initially seeking a frame that would fit all of these differences into one instructional method. Their finding, however, was that variability is the norm: no two students learn alike, regardless of ability. Curriculum design at the time was largely monolithic, forcing all students to receive information and demonstrate skills in only one way. David Gordon writes about the need to recognize and design for learner variability:

> Options are essential to learning, because no single way of presenting information, no single way of responding to information, and no single way of engaging students will work across the diversity of students that populate our classrooms. Alternatives reduce barriers to learning for students with disabilities while enhancing learning opportunities for everyone. (Council for Exceptional Children, 2011)

CAST set about translating Ron Mace's principles of Universal Design for the built environment into ways to design the interactions in elementary and secondary education systems. Their resulting framework is called Universal Design for Learning (UDL), and maps the seven principles of UD into three principles specific to learning and neurological processing, focused on three brain-based information networks.

Brain Network	Question	Solution
Recognition	The what of learning. How do we gather information?	Present information in multiple ways.
Strategic	The how of learning. How do we express our ideas?	Differentiate the ways that students can express what they know.
Affective	The why of learning. How do we motivate learners?	Find a way to connect with student interests. Provide multiple methods of engaging with the material.

(CAST, 2016)

It is important to note that, in the UDL framework, there is no requirement that information be presented in all of its different possible permutations, or in one unique way per student, like the theory of Differentiated Instruction (DI) asks for, in which teachers identify the strengths of their learners and then customize instruction to play to those strengths. Rather, UDL posits that designing for learner variability ahead of time—before instructors even know their students yet—is the most effective way to reduce individual accommodation needs. In other words, offering students choices in how to recognize, engage with, and report back the

information that they learned increases the chances that instructors can connect with their students and their learning needs.

For example, I know a Grade 10 English teacher in Ontario, Canada who was considering whether or not to ask his class to read the novel *To Kill a Mockingbird*. Some students were high achievers who would benefit from the traditional read-out-loud-and-discuss model. Others were visibly unengaged, and a few had Individualized Education Programs (IEPs) that required audio books and guided prompts throughout the content. The teacher wondered if taking on a novel as complex as *To Kill a Mockingbird* was really wise, given the diversity of learners in his class. After speaking with a UDL facilitator, he decided to give a try. The first thing he did was to make sure that all of the students had access to the audio version of the book, not just the students with disabilities. This immediately gave his students a choice of how to experience the book. He also started off the lesson by showing them scenes from the 1962 Robert Mulligan film based on the book.

Some of his colleagues questioned this decision, claiming that the students wouldn't read the book if they had access to the audio version or had seen the film. The English teacher argued that it was more important for students to have a general knowledge of the story and cultural milieu—which the movie would provide—and the book itself would serve to fill in the details. Indeed, knowledge construction and analysis were the stated learning objectives for the unit that the teacher had prepared. His UDL approach tied the choices given to learners directly to the goals, objectives, and targets of the interactions, and that is why the approach was effective.

The teacher asked the students to research a historical occurrence that happened during the book's time frame that was interesting to them, and to teach the class about it. The students worked in groups and researched everything from the music of the civil-rights era to well-known leaders and the laws referred to in the story. Giving the students choices about how they responded to the common text increased their engagement with the subject. The English teacher believes that if he had not added the principles of UDL to his first foray into *To Kill a Mockingbird* it would not have been so successful.

UNIVERSAL DESIGN FOR LEARNING IN HIGHER EDUCATION

In the United States and Canada, higher education has not been as quick to adopt UDL as it has been in the elementary and secondary settings. UDL in higher education began in earnest in the early 2000s, when the Office of Postsecondary Education (OPE) in the U.S. Department of Education created grants for colleges and universities seeking to bring the concept to higher education. The OPE saw the positive effects of inclusive-design efforts in elementary and secondary education and recognized that as students in those schools graduated and transitioned to college, they would expect the same breadth of learning opportunities as they had previously enjoyed. Many of those who applied for and received the federal grants were members of disability-service offices in colleges and universities. In the early 2000s, campus disability-services offices were most likely to be part of conversations about inclusive education and were the campus areas most likely to know about the work of CAST. They also saw UDL as a built-in service to improve the educational experiences of both the students with disabilities with whom they worked, as well as of those who chose not to disclose disabilities or who had yet to come to their offices.

The success of the OPE grants was enormous. These grants worked to figure out how to bring inclusive design to college and university campuses, given the differences among

elementary, secondary, and higher education. Grant-funded researchers recognized the difficulty in mandating any particular training or implementation scheme in college and university settings. For this reason, most grantees created implementation frameworks not through a disability-services lens, but rather through the diversity lens that Ron Mace established years ago for UD.

The goal of the OPE grants was to increase awareness about inclusive design in higher education. Different OPE-grant institutions created or adopted different definitions and approaches to accessibility, all based on UD. Each of these definitions, approaches, and strategies differs slightly in its approach and scope.

Some institutions simply adopted the core principles of Universal Design (UD) as-is from the Center for UD. The University of Wisconsin system used the UD architectural principles to increase access for students with disabilities. They focused on using UD to increase the accessibility and usability of the educational technology that the university was using at the time.

Other institutions focused on crafting education-specific offshoots from UD. Universal Course Design (UCD) includes curriculum design, instruction techniques, assessment methods, and learning-environment design. The University of New Hampshire and the University of Massachusetts-Boston collaborated to create UCD core teams: in-house support teams who helped small groups of faculty members to modify their course designs during the course of a semester.

Universal Design for Instruction (UDI) and Universal Design in Education (UDE) are closely linked, in that they both apply the seven architectural UD principles to higher education spaces. OPE grantees who adopted UDI and UDE tended to focus on making physical environments more accessible and flexible. Longwood University developed a training curriculum to support new, part-time, and temporary foreign-language instructors in inclusive-classroom techniques. The University of Connecticut crafted three phased projects intent on including students with learning disabilities in college courses. The Disabilities, Opportunities, Internetworking, and Technology (DO-IT) Center at the University of Washington established a national reputation for collecting and developing resources to support instructors in applying UDE tenets, and later adopted the UDL framework for its materials and approach.

The focus of this presentation paper is Universal Design for Learning (UDL), which follows the three principles of multiple means of engagement, representation, and action established by CAST. At Temple University, the OPE-grant project included UDL in the orientations for new faculty and staff members, who were then asked to incorporate the principles in their courses and student interactions. The University of Iowa conducted a campus UDL needs assessment and developed a university-wide policy focusing on the goal of giving universal access to learning interactions. The University of Hawaii combined UDL with multiculturalism and mentoring in an effort to get campus staffers and faculty members to support diverse learners better. Colorado State University's twice-funded project focused on supporting faculty members in adding UDL strategies to the materials that they created for their courses.

The OPE grants resulted in a diverse group of researchers trying to figure out how to best introduce the concept of inclusive design into the college environment. Each project branched out on its own to create its own sense of how inclusive design could be integrated into the higher-education landscape. Despite the varying acronyms and strategies, UD, UCD, UDI, UDE, and UDL all try to answer the same question. How do colleges and universities adopt a set of design principles for learners' interactions with materials, each other, their instructors, and the wider world that positively affects the greatest number of students from the start?

This presentation paper focuses on the Universal Design for Learning framework as the most easily adopted in colleges and universities, for and audience of adult learners. Many higher-education faculty members and staff members are using UDL strategies in their work. Colleges and universities are increasingly broadening the scope of their efforts to address student diversity across an increasing number of identity spaces, including ethnicity, socio-economic status, gender and sexual identity, and, now, the ability spectrum.

For example, Professor Lyman Dukes at the University of South Florida at St. Petersburg worked with his Accessibility Committee to study the impact of captioning on all students in a Law and Business course. He recorded his lectures and gathered all of the multimedia materials that he used throughout the semester. He then captioned all of his videos and posted them online for his students to access. At the end of the semester, he surveyed his students about their attitudes toward captioning. Ninety-four percent of his students reported that the ability to turn on the captions while watching his videos was helpful, and ninety-two percent of them actively used the captions. Only one percent of his students reported working with the university's disability-services office, although 13% said that they identified as having a disability and had not yet registered. Professor Dukes' small-scale study is an example of the individual approach many faculty members have taken toward implementing UDL principles in their courses (Dukes, 2014).

Some institutions have entire departments that have embraced UDL. In Boston, Suffolk University's Mathematics Department faculty members have rethought the way that they offer instruction to their students. After dealing with inaccessible textbooks and an increase in the number of students who struggled to pass first-level math courses, the department got together and focused on addressing learner variability. They now offer a math course designed for students who don't love math, where learners apply math concepts to real-life situations. The student feedback has been phenomenal.

At the University of New Hampshire, the Occupational Therapy (OT) Department ran a small study a few years ago implementing UDL strategies (specifically sharing videos of OT movements) into one section of a core course, using another section as a control group. After seeing the grade improvement and overall student understanding of OT increase, the department decided to adopt UDL as a group and infuse those strategies into all of their courses. They try to add at least one new strategy each time a course is taught, evaluating its effectiveness as a department at the end of the semester.

Few institutions have yet adopted the concept of Universal Design for Learning as an entire institution. Rather, while many agree that it is a good idea and actively support grass-roots efforts on the part of their instructors, institutions tend to devote their resources elsewhere. My aim in this presentation paper is to provide reasons, research, tools, and arguments for moving beyond the individual-adoption stage and moving toward campus-wide UDL implementation.

Emotional valence and accommodations

Most of us have had the experience of receiving accommodation requests from students with disabilities. Our emotional response to UDL gets inflected with the valence from our experiences making disability accommodations. Valence refers to our emotional coloring for "events, objects, and situations. . . . [T]hey may possess positive or negative valence; that is, they may possess intrinsic attractiveness or aversiveness" (Frijda, 1986, p. 207).

We all know how faculty members and staff members *should* respond when students come to them with disability-accommodation forms at the end of the second week of class (because the paperwork seems never to be done on time), saying, "I need time and a half on tests." Of course, the answer should be "Sure, I'll set that up." This, thankfully, is how most people do respond. But how do a lot of us actually feel about accommodation requests?

Researchers have been studying for decades how we in higher education respond to students with learning challenges. In a dozen large research studies (Fonosch & Schwab, 1981; Fichten, 1986; Nelson et al., 1990; Houck et al.,1992; Bento, 1996; Benham, 1997; Bigaj et al., 1999; Cook et al., 2009; Murray et al., 2009; Zhang et al., 2010; Lombardi & Murray, 2011; Murray et al., 2011), the emotional valence associated with accommodations is almost uniformly negative.

In many faculty members' minds, the fact that one must accommodate learners with disabilities brings up feelings of uncertainty, confusion, annoyance, and even anger. These emotions came to the surface in one 2017 instance, when Michael Schlesinger, a professor of atmospheric sciences at the University of Illinois at Urbana-Champaign, was placed on paid administrative leave because he refused to provide electronic copies of lecture slides in advance of class sessions for a student who had a documented disability accommodation. Schlesinger argued that

> based on my experience of providing all my students my lecture slides after each lecture for most if not all of the 16 times I have taught this course, I knew that one-third of my class would cease coming to my lectures if I provided them my lecture slides electronically. And their ceasing to attend my lectures would lower their course grades. (Flaherty, 2017)

The professor derided the disability-services staff member who notified him about the student's accommodation, writing that "although you have a doctorate, I doubt that you teach. Although you have a doctorate, I doubt that you do research," and saying that he would "fight for a more balanced approach to assisting disabled students, an approach that does not disadvantage non-disabled students" (Flaherty, 2017).

Most of us do not react as extremely, thankfully. Regardless of whether we act consciously on negative emotions, however, they ground our approach to learners with disabilities. In the research literature and in interviews with faculty members and staffers throughout North America, we hear similar feedback:

- "I don't have time to do all that work if it benefits just a few students with disabilities."
- "My institution doesn't have a captioning service. I'd have to do it all myself, and I have a lot of videos."
- "I think at least a few of my students are trying to game the system by claiming to have disabilities."
- "I know I should follow the law, but no one at my institution is enforcing it."
- "I haven't had a student with a disability for years. I will just wait until I get an accommodation request."
- "I've had a number of students come to me with 'learning disabilities,' but they don't seem to be disabled when I interact with them in my courses."

In all of these scenarios, the contrary is actually so. Sam Johnston, a research scientist at CAST, says that "we want a situation that is good for everybody. Part of it is thinking about what has to happen at the level of design that makes accommodation less necessary" (personal communication, November 15, 2013). Johnston means that by adopting UDL principles in our course design, we greatly reduce the need for specific accommodation requests.

So, what do we do next?

Most of our existing college and university training programs and advocacy for adopting UDL stand poor chances of being effective, due to the negative emotional valence associated with making disability accommodations—even though UDL is not a means of granting individual disability accommodations (making one change, one time, to help one person). Despite this, our collective experience of making accommodations colors our response to a term that we think is associated with the same subject: learners with disabilities. We react.

We react for many reasons. Applying UDL can be expensive and resource intensive. It takes design-level thinking, often beyond our current scope of subject expertise. UDL is not perceived as being for everyone—just for people with disabilities. The work we put into UDL is perceived as benefiting a small slice of our learners, so why not just wait until we get accommodation requests?

We must first uncouple UDL from the negative emotional valence of people's experiences with accommodation requests. For that, we propose two re-framing statements: These form the core principles of this presentation paper.

- Our students today aren't like our students even fifteen years ago.
- Our faculty members aren't like their counterparts from the past, either.

UDL is not just faculty members' job

Next, we should move the focus away from training only faculty members about UDL. Let's train the people who support them: IT departments, teaching-and-learning centers, media-services areas, academic-department staff, and the help desk.

There is near consensus that institutions are responsible for providing education to the broadest audience of learners (Rapp & Arndt, 2012). Too often, though, we leave inclusion to the office of disability services or to individual faculty members. UDL training courses increase faculty members' confidence in working with students across the ability spectrum (Murray et al, 2011), but the higher-education UDL adoption rate hovers around 10% of faculty members (cf. Murray et al., 2009). Why? Faculty members don't do what they used to.

Over the past three decades, the role of faculty members has become increasingly atomized. Included in their primary duties, faculty members in 1985 were expected to

- design their course structure,
- create individual syllabi,

- pull together ancillary materials (e.g., prof packs, transparencies, and vendor-produced VHS tapes),
- teach course sessions,
- grade student work, and
- hold office hours.

Today, faculty members are still responsible for content expertise. However, much of what used to be individual faculty members' job is now the responsibility of the whole faculty (e.g., agreeing on common syllabi, reading lists, and texts) or support staff (e.g., creating videos, multimedia, and LMS content). Often, course content and interactions are designed by a team:

- the faculty members,
- an instructional designer,
- a media specialist,
- an IT coder, and
- others throughout the institution.

UDL training should focus on the people who actually put together the interactions for learners, and here we're referring not only to designing courses, but to designing the interactions that students have with our application processes, registrar's offices, tutoring services, and other touch-points common to the higher-education experience. For all types of interactions, we can apply UDL principles to make it easier for everyone to engage with them. Implementing UDL principles across an institution requires leadership support and resources. As Candyce Rennegarbe at Tacoma Community College reports, the investment is worth it:

> By far, strong administrative support is the most important element. Our Vice President of Academic and Student Affairs has supported this project with funding and personal support since we started. He has used Achieving the Dream [program] funds and reserve funds; no major grant funding has been accessed to fund this project. We give release time to a faculty member to be the project manager in an affordable way to make sure there is sustained leadership. . . .
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> We have also secured stipends for faculty members and mentors and have involved the instructional research department from the beginning. We have a strong cross-disciplinary advisory team (Dean/VP of Instruction, Access Services, E-Learning, Developmental Studies, Professional Development, Student Services, Faculty), and strong support for building technology resources on campus. (in Meyer, et al., 2014, p. 169).

This approach—training those who actually do the development work on materials and interactions on which UDL touches—results in greater levels of adoption of UDL across the institution (Meyer et al., 2014, pp. 172-173).

The College STAR (Supporting Transition, Access, and Retention) consortium, for example, is a UDL success story. Colleges and universities across North Carolina used a federal grant in order to create a curriculum shared across campuses (College STAR, 2015). All

participating campuses sent their support and design staff to UDL training sessions; now all courses are created with UDL principles in mind.

This is the goal of UDL, after all: to reduce barriers to learning for everyone. While we should keep learners with disabilities always in mind, we serve the broadest audience by situating UDL as a way to reach mobile learners through any-time, anywhere interactions, and we should train our support staff in UDL, so faculty members who want to innovate are automatically presented with UDL as just the way things are done at our institution.

HOW TO RE-FRAME UDL FOR ADULT LEARNERS

We should re-frame UDL beyond a narrow disability-services mindset and situate it in an emotionally neutral narrative with which we're all familiar: mobile learning. This helps us to address some key challenges in higher education. For example, in comparison with learners just fifteen years ago, college students today are

- more likely to require remediation (Adams, 2015),
- more likely to have poor study and time-management skills (College Board, 2015), and
- less likely to have significant time for study outside of the classroom (College Board, 2015).

Many college students are adult learners with families and jobs—and little time for studying: "Adult learners are juggling family, work, and educational responsibilities. They don't do optional" (Mason, 2014). Even our 18-22-year old students are often juggling work and study responsibilities. Today, the young, single college student who lives at home, takes a full load of courses, and focuses solely on his or her studies is, with few exceptions, a mythical creature.

On the other hand, a recent EDUCAUSE study shows that 86% of college students in North America own smartphones (Chen et al., 2015). Couple this with busy lifestyles, and adopting a mobile-friendly design framework like UDL fosters any-time, anywhere learning:

> As an integral part of students' daily lives, mobile technology has changed how they communicate, gather information, allocate time and attention, and potentially how they learn. . . . Learners are no longer limited to the classroom's geographical boundaries; for example, they can now record raw observations and analyze data on location. Furthermore, mobile technology platforms let individuals discuss issues with their colleagues or classmates in the field. The ever-growing mobile landscape thus represents new opportunities for learners both inside and outside the classroom. (Chen et al., 2015)

The argument for adopting UDL has always been based on its benefits for all learners, but for years we haven't had a simple case that demonstrates those benefits. Now we have one: UDL reaches out to learners on mobile devices and gives them more time for studying (Tobin, 2014, pp. 20-24). Giving learners with family, work, and service obligations just twenty more minutes in their busy days for learning and interacting can be the difference between struggling and keeping up with their studies.

Before we can dive in to practical applications about how best to apply UDL principles to our courses, programs, and institutions, we must first determine how to uncouple UDL from the

negative emotional valence of people's experiences with requests for specific accommodations. For that, I want to posit two radical reflections on the nature of teaching and learning in higher education today: our students today aren't like our students twenty-five years ago, and our faculty members aren't like their counterparts from the past, either.

Adults are mobile learners

Adults today, especially the group of people between the ages of 20 and 40, are labeled the "digital generation" by scholars and thinkers like Howard Gardner, Ian Jukes, and Ted McCain. The usual way that futurists talk about the digital generation is to see them as somehow separate from the rest of us, by dint of their use of technology.

> Learning itself has undergone a transformation over the past thirty years. The Internet is changing the way that . . . college students gather and process information in all aspects of their lives. For Digital Natives, "research" is more likely to mean a Google search than a trip to a library. They are more likely to check in with the Wikipedia community, or to turn to another online friend, than they are to ask a reference librarian for help. (Palfrey & Gasser, 2008, p. 239)

It is problematic to think about a generation made up of digital natives, though, because technology use is not an age-based concern, and expertise is definitely not conferred merely by being younger. Think for a minute about how you and the students at your institution use your mobile phones now. Regardless of our ages, all of us have become more scheduled, more connected. What theorists say is a characteristic of teens sounds familiar to those of us much older, too:

> Sixty-three percent of teens say they text every day with people in their lives, and the typical teen sends about sixty text messages per day. . . . And now, with the widespread use of app-filled smartphones, the range of operations that teens can perform on the go has extended far beyond phone calls and texting. . . . The app mentality supports the belief that just as information, goods, and services are always and immediately available, so too are people. Scholars in the mobile communication field have dubbed such in-the-moment planning micro-coordination. (Gardner & Davis, 2013, p. 94)

Of course, being a micro-coordinator is just a fancier way of saying that all of us have become very, very, *very* attached to our phones. And it's not just teenagers. Google collects massive amounts of data about how Internet users across the globe interact with their devices. Because it is far and away the most-used online search portal, Google knows not only what we search for, but also how long we spend in given kinds of online tasks, what devices we are using to accomplish those tasks, and what our online habits say about our learning needs, especially as they relate to our immediate everyday tasks and goals.

In a 2015 report entitled *Micro-Moments: Your Guide to Winning the Shift to Mobile*, Google's team of researchers compiled trillions of data points into some eye-opening numbers about how closely our smartphones have become integrated into the rhythms of our everyday

lives. Since 2010, the balance of Internet-connected device ownership, use, and dependence has shifted decisively away from place-bound computing and toward mobile Internet access.

> Millennials? They're really attached. 87% always have their smartphone at their side, day, and night. That little device by our sides is transforming our lives, whether we actively notice it or not. It's enabling new ways of doing and learning things. It's helping us discover new ideas and new businesses. It's helping us manage our to-dos, tackle our problems, and inspire our plans.
> Mobile search behavior is a good reflection of our growing reliance: in many countries, including the U.S., more searches take place on mobile devices than on computers. Mobile is quickly becoming our go-to. When we want or need something, we tune in via convenient, self-initiated bursts of digital activity.
> Take the oft-quoted stat that we check our phones 150 times a day. Pair it with another that says we spend 177 minutes on our phones per day, and you get a pretty fascinating reality: mobile sessions that average a mere 1 minute and 10 seconds long, dozens and dozens of times per day. It's like we're speed dating with our phones. (Adams, Burkholder, & Hamilton, 2015, p. 3)

The report from which all of this Google research comes is not intended to help us educators to connect with our far-flung and busy students. The report is meant to convince companies to spend advertising dollars to reach out to people who can't seem to put their phones down.

However, we academics can learn from what Google has figured out. Google calls most people's pattern of using their mobile phones "micro moments." All of us—not just members of a particular generation—use our phones to help us to make decisions in everyday situations like researching brands of toothpaste or comparing the quality of bed-sheet sets, all while we are standing in the store aisle. We place calls on our phones when we want to move from the world of information to the world of people. Once we find the set of sheets we want, we might then call the customer-service line for the store in which we are standing, to inquire about stock in other colors. We use our mobile devices to help us make decisions: Thai, Chinese, or barbecue? And which restaurant is closest? And which one also gets the best reviews on Yelp?

Google advises companies to create small snackable pieces of content and interactions to which people can get access via different media, based on the choices (and devices) of the people who want to interact:

> Here are three essential strategies that can help you win micro-moments:
>
> - Be There. You've got to anticipate the micro-moments for users in your industry, and then commit to being there to help when those moments occur.
> - Be Useful. You've got to be relevant to consumers' needs in the moment and connect people to the answers they're looking for.
> - Be Quick. They're called micro-moments for a reason. Mobile users want to know, go, and buy swiftly. Your mobile experience has to be fast and frictionless. (Adams, Burkholder, & Hamilton, 2015, p. 6)

If you find that you are engaging in such micro-moments throughout most days, that you are snacking on information for a few seconds at a time, in the moment when needs or curiosity arise, then you are a part of the digital generation. Elizabeth Losh makes the point that the very labeling of a group of people encourages us to see them in a simplified, homogeneous fashion.

> I've been a public opponent of casting students too easily as "digital natives" for a number of reasons. Of course, anthropology and sociology already supply a host of arguments against assuming preconceived ideas about what it means to be a native when studying group behavior. I am particularly suspicious of this type of language about so-called digital natives because it could naturalize cultural practices, further a colonial othering of the young, and oversimplify complicated questions about membership in a group. (Losh, 2014).

We want to broaden this concept to include many ways of interacting with each other and with technology, and to un-moor it from a generational definition.

In a significant sense, the terms "digital natives" and "digital generation" have been around longer than the connected-anytime-and-anyplace reality that they attempt to describe. For example, in 2008, John Palfrey and Urs Gasser described digital natives as being tech experts, but place-bound by their desktop and laptop computers:

> In the Internet context, images and stories of this sort are accessible from any Internet-ready device—a laptop sitting around the house or a cell phone with a decent Web browser (though, to be clear, most Digital Natives rarely access the Web through these devices today). (Palfrey & Gasser, 2008, p. 88)

Only a decade later, that caveat at the end about how few people use their phones to go online seems almost quaint: today's eighteen-year-old college freshmen can barely remember a time when web access wasn't part of mobile-phone technology, and people in their thirties, forties, fifties, and beyond have largely adapted to a world in which mobile computing is simply part of the fabric of everyday life, even if they themselves might not be the savviest participants in that mobile culture.

Mobile learners are typically identified by the technology that we adopt or master, rather than the historical epochs in which we live.

> Only in recent memory has characterization of a generation taken on a distinctly technological flavor. In his studies of successive waves of college students, Arthur Levine (with colleagues) has discerned a revealing trend. Students in the latter decades of the twentieth century characterized themselves in terms of their common experiences vis-à-vis the Kennedy assassination, the Vietnam War, the Watergate burglary and investigation, the shuttle disaster, the attack on the Twin Towers in September 2011. But once the opening years of the twenty-first century had passed, political events took a back seat. Instead, young people spoke about the common experiences of their generation in terms of the Internet, the web, handheld devices, and smartphones. (Gardner & Davis, 2013, p. 50)

Our approach to defining the digital generation is to say that all people who use mobile technology on a daily basis for problem-solving, information-gathering, and social purposes—regardless of their age—are mobile learners. This definition allows for variation among the skill sets, background knowledge, and breadth of application that we all possess. This variation is key to my assertion that, as faculty members and learning designers, we should move away from a people-with-disabilities mindset when it comes to UDL, and we should move toward a people-with-mobile-devices mindset.

GROWING BEYOND THE ROOTS OF UDL

UDL began in the disability-advocacy community as a way of creating a more inclusive society, generally. "Recognition of disability as a civil right entails making sure that a person with a disability has access to the buildings, classrooms, and courts where those rights are learned and adjudicated" (Davidson, 2006, p. 126). UDL is an outgrowth of universal-design ideas in the built environment—such as allocating parking spaces for drivers with disabilities (and keeping the shopping-cart corrals out of them).

UDL can often get mired in people's perceptions of a "medical model" that perceives disability as primarily a health issue, where disabilities are deficits in function that reside within the individuals themselves. This medical model of disability helps to explain why many people unconsciously associate negative emotions with their interactions with people who have disabilities (Stodden et al., 2011): the "otherness" is associated with the people with whom we interact. Contrast this with a social model of disability, in which the disabling factor is seen to be in the environment. If a student in a wheelchair encounters a library building with stairs but no ramp, the disability is not inherent in the student—it is the design of the building that presents the challenge.

Because higher education is largely in transition between these two mental models of disability, my first radical reflection about UDL is to re-frame it away from the concept of disability all together, and situate UDL in a narrative with which all faculty members and staffers are familiar—and one which has a much more neutral emotional valence: mobile learning.

In comparison with learners from only fifteen years ago, the students who come to college today are significantly more likely to require remedial instruction (Adams, 2015), more likely to have poor study habits and time-management challenges (College Board, 2015), and less likely to have significant time for study outside of the classroom. In North America, more college students than ever before are adult learners with family and job responsibilities—and precious little time for studying: "Adult learners are juggling family, work, and educational responsibilities. They don't do optional" (Mason, 2014).

A recent EDUCAUSE study shows that 86% of college students own smartphones, and a significant percentage also own other mobile devices such as tablets (Chen et al., 2015). The authors of an article reporting on the study extol the potential benefits of any-time, anywhere learning and collaboration:

> As an integral part of students' daily lives, mobile technology has changed how they communicate, gather information, allocate time and attention, and potentially how they learn. The mobile platform's unique capabilities—including connectivity, cameras, sensors, and GPS—have great potential to enrich the academic experience. Learners are no longer limited to the classroom's

geographical boundaries; for example, they can now record raw observations and analyze data on location. Furthermore, mobile technology platforms let individuals discuss issues with their colleagues or classmates in the field. The ever-growing mobile landscape thus represents new opportunities for learners both inside and outside the classroom. (Chen et al., 2015)

The argument for adopting Universal Design for Learning was always based on the broad benefits that UDL methods provide to all learners, but for years we haven't been able to find a compelling and simple, case that demonstrates in a concrete way how those benefits play out. Now we have one: UDL is a way to reach out to adult learners on their mobile devices to help them to find more time for studying and engaging in learning.

An important aside: if the fight for access to the built environment has largely been won, thanks to the protests and voices of disability-rights advocates, the fight for the rights of people with disabilities in higher education continues in earnest. In recent years, several high-profile court cases took nationally-prominent institutions to task for failing to meet even the minimum legal requirements, such as the decision against Harvard and MIT for not captioning their edX course materials (Lewin, 2015). In advocating for a switch in tactics to broaden the argument for adopting UDL practices, I am cognizant of the way that such a switch can take the spotlight off people with disabilities. My hope is that making the argument that adopting UDL benefits students using mobile devices will reduce the need for making specific accommodations and move us closer to the larger goal of disability advocacy, which is to allow everyone to have the same opportunities to learn—to erase difference and separate accommodations as far as possible.

Imagine a single mother—call her Melissa—who is taking business-management courses at her local community college. She has a job in order to be able to support her family, and she takes courses in the evenings and on weekends. She does her homework, engages with the course readings, and completes her course projects after 10:00 p.m., when the kids are finally in bed. Her statistics-course professor has posted video clips in the learning management system as study aids toward the midterm and final exams, but Melissa cannot take advantage of the videos because she doesn't want to wake her children, but she doesn't want to tune them out altogether by using headphones. Melissa does not have a disability, but she does have a challenge: time.

Now, imagine if Melissa's professor provided transcripts of the audio in the video clips, or, better yet, captions. Melissa can turn down the sound, turn on the captions, and study for her course examinations, while remaining accessible to her children. Adopting good UDL practices lets Melissa's professor reach out to her—and to all of her classmates—with options that allow them to choose how they experience the materials that the professor has posted. This is a double win: the professor's work in creating the videos and one alternative version is rewarded with more students actually using the resources, and the professor's students are rewarded with more flexibility in how they study for the course and learn its materials, concepts, and processes.

Imagine, too, a student on the football team at a large university in the Southeastern United States: call him Jamaal. Jamaal is often on a bus or train, traveling to away games with his teammates. He already has a special arrangement that allows him to miss a certain number of in-person course meetings in his chemistry course, and he realizes that he's missing out on an opportunity for learning. He wants to keep up with his professor's narrated lecture slides, but his Internet connection is spotty when he is traveling. Jamaal has to wait until he is back on campus to be able to download and open his professor's PowerPoint slides from the course web-

resources page, since his mobile phone doesn't have Microsoft Office on it. Jamaal does not have a disability, but he does have a challenge: resource availability.

Now, imagine if Jamaal's chemistry professor took the same narrated PowerPoint slides and created a scree-capture version that was then uploaded to YouTube. Jamaal—and all of his classmates—could then stream the video, even under challenging bandwidth conditions, and he would not need any specific software title in order to experience the lecture slides. Jamaal could then easily break a stereotype about student-athletes and study while he is on the bus or the train.

Finally, imagine a student—call her Amanda—whose National Guard unit is called up for an active-duty military tour of duty, right in the middle of her studies toward her nursing degree. Amanda's professor in her anatomy and physiology course requires all students to pass a two-part final examination, in which the professor and student meet one on one and the professor quizzes the student on the name and location of various parts of the human body, with the professor providing one piece of information (the name of the part or its location on an anatomical model), and the student providing the other, by naming the part or pointing to the location on the model associated with the name. Amanda suspects that she will need to drop the course, since she will not be present to be able to complete the final examination, and there are no options for demonstrating her knowledge in a different way. Amanda thought she could buy her own anatomical model, but a quick look online showed her that the model used by her professor costs upward of $6,000.00. Amanda does not have a disability, but she does have a challenge: distance.

Now, imagine that Amanda's professor offered students two different ways to take the final examination: in person (as above) or by Skype or other video-call software, using un-labeled diagrams provided by the professor ahead of time. The professor asks the student to pan the camera being used around himself or herself to show that there are no open books or study sheets being used, and the student can schedule the one-on-one time when and where it is most convenient to conduct the exam. Amanda uses the "private calls to home" area where she is deployed in order to do her live session for the final exam, and is able to continue her studies.

These examples highlight professors adopting UDL techniques in order to reach out to their students who are using mobile devices in order to overcome distance, time, and resource limitations: challenges that we can all relate to, and which are not freighted with aversive emotional valence. If anything, these stories about designing course interactions for mobile learners are uplifting, and they provide faculty members with motivation to put in the effort up front. Educator Allison Posey is interviewed in CAST's recent book *Universal Design for Learning: Theory and Practice* about why she adopts UDL practices: "I work the hardest the first time I design a lesson; then it gets much easier and I even find that I do not have to re-teach the content as often: most students get it the first time" (Meyer et al., 2014, p. 161).

In my own work with faculty members and support staff at colleges and universities across North America, this is often the most difficult argument to make. Put in significant effort ahead of time, during the design or re-design of course interactions, in order to increase learner engagement, options for taking in information, and options for control and choice in demonstrating knowledge and skills. This effort will then pay the faculty member back many fold in the form of decreased student questions, decreased requests for accommodations, and a re-focus away from the administrative minutiae of the course back to the interactions with students that motivated many of us to become faculty members in the first place. Adopting UDL also pays the institution back many fold in the form of increased student persistence, retention, and satisfaction. Because this argument is a challenging one to put forward, I pair it with my

second radical reflection about UDL: we should stop training individual faculty members how to do it.

It's just me and the computer

In many institutions, there is near consensus among faculty members and campus leaders that the institution itself bears a responsibility to provide educational opportunities to the broadest possible audience of learners (Rapp & Arndt, 2012). However, there is often a disconnection between that high-level responsibility and its operational implementation. Too often, the challenge is left to be addressed by an institution's office of disability services, which provides non-mandated training courses on UDL and outreach techniques to individual faculty members.

A recent study of such training programs found that they increase faculty and staff confidence in working with students across the ability spectrum (Murray et al, 2011), but the adoption rate for UDL principles in North American colleges and universities continues to hover around 10% of faculty members in most reported research (cf. Murray et al., 2009), with the highest concentrations among faculty members in Education departments and colleges. Unlike the Americans with Disabilities Act in the United States, Canada does not yet have a nationwide set of laws requiring accommodations for people with disabilities. Starting in 2014, Roberta Thomson at McGill University in Montreal began a still-ongoing study in which she and her colleagues interviewed faculty members about their perceptions surrounding and adoption of UDL; her preliminary data suggest that even with training in UDL practices, only a small fraction of faculty members go on to implement UDL in a significant way. Dr. Thomson hypothesizes that this is due to the fact that most faculty members do no choose to attend UDL training, and, of those who do attend, a large percentage of faculty member report not having enough time to be able to accomplish a "full" UDL re-development of their existing course interactions (R. Thomson, personal communication, December 16, 2015).

At my own university, and when I consult with other institutions, I advocate that we move the focus away from training faculty members in UDL principles, and start training the people who support faculty members in the course-design process: people in our IT departments, our teaching-and-learning centers, our media services areas, academic-department staff members, and the help desk staff.

Over the past three decades, especially, the role of faculty members in academia has become increasingly atomized. Faculty members in 1985 were routinely expected to design their course structure, create their own individual syllabi, pull together their ancillary materials (which often took the form of photocopied "prof packs" of readings, overhead transparencies, and vendor-produced VHS tapes on topics of interest), teach their course sessions, grade student work, and hold office hours for communicating with students outside of class time. Fast forward to today, and faculty members are still responsible for their content expertise. However, large swaths of what used to be the domain of individual faculty members has become the responsibility of the faculty as a whole (agreeing on common syllabi across course sections and even common reading lists, texts, and resources) or the responsibility of support staff (e.g., creation of video clips, multimedia content, and course content for use within a learning management system). In many cases, the design of a course's content and interactions is accomplished by a team of experts, of which the faculty member is only one part, in collaboration with an instructional designer, a media specialist, an IT coder, and others

throughout the organizational chart of the institution. This has not saved faculty members any time, incidentally: faculty members in 1985 didn't have email or always-on connections to their course environments to contend with.

This is why I advocate focusing our UDL training on the people who actually put together the designed elements and interactions for courses, listed above. Imagine the following scenario under a faculty-only training regimen and then under a train-the-support-staff model.

Train the support staff in UDL, too

Professor Wilson wants to expand her sophomore-level algebra course to provide access, encouragement, and choice for as many students as possible. She has heard that the flipped-classroom model tasks students with encountering new ideas on their own, leaving time for engagement, inquiry, and assessment when the learners and professor are together. She goes to her media service people on campus and talks to George at the service desk about her options for doing lecture capture. George responds in one of two ways:

A) George tells her that the media-services department has the equipment she will need in order to do lecture capture, and that he can even schedule a student worker to come to Professor Wilson's classroom to set up and run the equipment while she is teaching. Professor Wilson will get a DVD of the raw video within three working days, or she can have the video uploaded directly to her online course-support environment. Professor Wilson asks about captions and accessibility. George says that she should contact the disability support office for more information.

B) George tells her that the media-services department has the equipment she will need in order to do lecture capture, and that he can even schedule a student worker to come to Professor Wilson's classroom to set up and run the equipment while she is teaching. Further, George himself will schedule a meeting with Professor Wilson once the raw video is ready in order to select the most appropriate parts of the video to select and keep as five-minute mini-lecture sessions. Once those are selected, Professor Wilson will receive a captioned version of the mini-lecture segments, along with a text transcript of the content, on DVD or she can have the video uploaded directly to her online course-support environment.

Note how in narrative A, the responsibility for UDL is perceived through a disability-accommodation lens, and "it's not my job" is the theme of George's support for Professor Wilson. Narrative B sharply contrasts this: George knows UDL best practices and states that his staff and Professor Wilson will follow them. They will chunk up the video and create transcripts and captions, all as a matter of course. George doesn't even call the actions "UDL," instead folding the best practices into the normal order of business for the media services area.

Implementing a change from narrative A to B in areas across an institution is no small undertaking. It requires leadership support and resources. As Candyce Rennegarbe at Tacoma Community College reports, the investment pays back an adopting institution handsomely:

By far, strong administrative support is the most important element. Our Vice President of Academic and Student Affairs has supported this project with funding and personal support since we started. He has used Achieving the Dream [program] funds and reserve funds; no major grant funding has been accessed to fund this project. We give release time to a faculty member to be the project manager in an affordable way to make sure there is sustained leadership. . . . We have also secured stipends for faculty and mentors and have involved the instructional research department from the beginning. We have a strong cross-disciplinary advisory team (Dean/VP of Instruction, Access Services, E-Learning, Developmental Studies, Professional Development, Student Services, Faculty), and strong support for building technology resources on campus. (Meyer, et al., 2014, p. 169).

This approach—training those who actually do the development work on materials and interactions that UDL touches on—results in greater levels of adoption of UDL across the institution (Meyer et al., 2014, pp. 172-173). There is one more piece to the UDL-adoption puzzle: "if you build it, they will come" (Robinson, 1989). But will they know how to use it?

FROM THREE DOMAINS TO "PLUS ONE"

CAST has narrowed the tenets of UDL down to three brain networks that are addressed by well-designed learning interactions: the affective, recognition, and strategic networks (CAST, 2015). Each of these neural networks corresponds to one of the strategic areas of UDL:

- **Affective networks:** the *why* of learning. How learners get engaged and stay motivated. How they are challenged, excited, or interested. These are affective dimensions. Stimulate interest and motivation for learning.
- **Recognition networks:** the *what* of learning. How we gather facts and categorize what we see, hear, and read. Identifying letters, words, or an author's style are recognition tasks. Present information and content in different ways.
- **Strategic networks:** the *how* of learning. Planning and performing tasks. How we organize and express our ideas. Writing an essay or solving a math problem are strategic tasks. Differentiate the ways that students can express what they know. (Meyer, et al., 2014, p. 90)

In working with faculty members and support staffers, I used to expand these domains into five areas of execution (Tobin, 2014). More recently, though, I simplify them down to one rule for UDL: adopt a "plus one" mentality.

It can seem like a nearly insurmountable task to take a course that has been offered at an institution for years without UDL practices in it and retrofit the entire course. There are likely to be dozens—if not hundreds—of elements and interactions in the course that need to have alternative formats and options created for them, to say nothing of all of the motivation and encouragement that needs to be made explicit and added in to the design of the course materials. Looking at the project in this way is daunting.

However, by adopting a "plus one" mind set, we can speedily chop down the work into parts that can we can work with. For instance, instead of creating all possible alternative formats for multimedia, select one consistently throughout the course. Create transcripts for video resources, but don't also create captions. Or vice versa; just be consistent.

Further, identify where the course materials will get the greatest impact from the inclusion of UDL principles. Talk with the faculty members who teach the course and learn the parts of the course where students

- always have questions;
- always get things wrong on tests, quizzes, and assignments; and
- always need things explained in more than one way.

Those are the "UDL hot spots" in the course. Focus efforts at adding UDL content and interactions around those hot spots for maximum impact. In their study on faculty willingness to adopt UDL principles, Lombardi and Murray seem almost surprised to come to a similar conclusion: doing the work up front reduces accommodation requests down the road.

> [A]ctions associated with adopting inclusive instructional practices can be broken down into measurable steps. Ideally, this operationalization of U[niversal] D[esign] principles will help inform and encourage faculty to modify their instruction to be more inclusive and accessible to a wider range of learners, which will benefit all students, with and without disabilities. Further, some items . . . illustrated the inherent overlap between accommodating students and adopting the UD principles. (Lombardi & Murray, 2011, p. 50)

Finally, draw a "line in the sand" for the institution regarding the creation of new content and interactions. As of an agreed-on date, mandate that all new materials meet UDL standards, to avoid continuing the need for retrofitting.

Sheryl Burghstahler and her team at the DO-IT Center at the University of Washington have put together a practical work flow for adopting UDL in higher education, which I have summarized here:

1. **Identify the application.** Specify the product or environment to which you wish to apply universal design.
2. **Define the universe.** Describe the overall population (e.g., users of service), and then describe the diverse characteristics of potential members of the population for which the application is designed.
3. **Involve consumers.** Consider and involve people with diverse characteristics in all phases of the development, implementation, and evaluation of the application.
4. **Adopt guidelines or standards.** Create or select existing universal design guidelines or standards.
5. **Apply guidelines or standards.** Apply universal design in concert with best practices within the field to the overall design of the application.
6. **Plan for accommodations.** Develop processes to address accommodation requests from individuals for whom the design of the application does not automatically provide access.
7. **Train and support.** Tailor and deliver ongoing training and support to stakeholders.

8. **Evaluate.** Include universal design measures in periodic evaluations of the application. (DO-IT, 2015)

By providing UDL training to the people on campus who actually do the work of course design and content creation, we stand the greatest chance of achieving broad-based implementation across the institution.

        A success story is the College STAR (Supporting Transition, Access, and Retention) consortium in North Carolina (College STAR, 2015), composed of colleges and universities from across the state that used a federal grant in order to create a curriculum shared across campuses. Because the grant required the use of UDL, all of the participating campuses sent their support and design staff to common training sessions, and now all of the courses and support mechanisms designed by the consortium are "born with UDL" as a matter of principle and practice.

        This is the goal of UDL, after all: to reduce barriers to learning for everyone. I argue that, while we should keep learners with disabilities always in mind, we can best serve the broadest audience of learners by making the case for UDL as a way to reach out to mobile learners as part of our any-time, anywhere learning initiatives, and that we should train our institutional support staff in good UDL practices, so that faculty members who wish to work on their courses will automatically be presented with UDL practices as "just the way we do things here."

CODA

        James is a 28-year-old junior at a university in British Columbia, studying to be a radio-station manager. He is carrying a 3.6 GPA despite his job working in a donuts-and-coffee place during the day. He is taking most of his communication and media courses online, and he goes to campus one day a week in order to take a course that isn't offered online. James is able to get by with the help of student loans and his income—and a little help from mom and dad now and then, too.

        Right now, it is 10:30 at night, and James is at his desk in the living room of his apartment, working on a project for his mass-communication course. His professor has asked students to research a chosen job role and then create a job application through a traditional written résumé, a two-minute audio presentation, or a two-minute video application. Because James wants to go into radio, he has taught himself how to use the free sound-editing program Audacity to mix and record his audio file.

        He is excited to complete this project, because, over the past week, James has been e-mailing back and forth with a radio-station manager in Vancouver, who encouraged him to reach out for a quick meeting. James has just concluded the interview with the station manager by Skype. He wearily saves his recording of the meeting and his notes, and he closes the lid on his laptop.

        He turns off the desk lamp, grips the wheels of his wheelchair, and rolls himself toward the bathroom to get ready for bed, because tomorrow is his day on campus. Just like any other student.

REFERENCES

Adams, C. J. (September 9, 2015). 2015 SAT, ACT scores suggest many students aren't college-ready. *Education Week*. http://www.edweek.org/ew/articles/2015/09/09/2015-sat-act-scores-suggest-many-students.html.

Adams, L., Burkholder, E., & Hamilton, K. (2015). *Micro-Moments: Your Guide to Winning the Shift to Mobile*. Mountain View, CA: Google. https://think.storage.googleapis.com/images/micromoments-guide-to-winning-shift-to-mobile-download.pdf.

Benham, N. E. (1997). Faculty attitudes and knowledge regarding specific disabilities and the Americans with Disabilities Act. *College Student Journal*, 31: 124-129.

Bento, R. F. (1996). Faculty decision-making about "reasonable accommodations" for disabled college students. *College Student Journal*, 30(4): 494.

Bigaj, S. J., Shaw, S. F., and McGuire, J. M. (1999). Community-technical college faculty willingness to use and self-reported use of accommodation strategies for students with learning disabilities. *Journal for Vocational Special Needs Education*, 21(2): 3-14. [periodicals 2nd floor]

CAST. (2014). UDL on campus: Universal design for learning in higher education—a guide. http://udloncampus.cast.org.

CAST. (2015). *About Universal Design for Learning*. http://www.cast.org/our-work/about-udl.html.

CAST. (2016). UDL and assessment. *UDL on Campus*. http://UDL oncampus.cast.org/page/assessment_UDL.

Center for Universal Design. (2008). About UD: Universal design history. North Carolina State University College of Design. https://www.ncsu.edu/ncsu/design/cud/about_ud/udhistory.htm.

Chen, B., Seilhamer, R., Bennett, L., and Bauer, S. (June 22, 2015). Students' mobile learning practices in higher education: A multi-year study. *EDUCAUSE Review*. http://er.educause.edu/articles/2015/6/students-mobile-learning-practices-in-higher-education-a-multiyear-study.

College Board. (2015). *2015 College Board Program Results, Expanding Access, Challenging Students, Equipping Educators*. https://www.collegeboard.org/program-results.

College STAR [Supporting Transition, Access, and Retention]. (2015). *About College STAR*. https://www.collegestar.org/about.

Connell, B. R., Jones, M., Mace, R., Mueller, J., Mullick, A., & Ostroff, E.(1997). *The Principles of Universal Design*. North Carolina State University Center for Universal Design. http://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciplestext.htm.

Cook, L., Rumrill, P. D., and 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.

Council for Exceptional Children. 2011. New guidelines for universal design for learning provide a roadmap for educators and educational publishers. https://web.archive.org/web/20120116035812/http://www.cec.sped.org/AM/Template.cfm?Section=Home&CAT=none&CONTENTID=10573&TEMPLATE=/CM/ContentDisplay.cfm.

Davidson, M. (2006). Universal design: The work of disability in an age of globalization. In *The Disability Studies Reader*. 2nd ed. Ed. Lennard Davis. New York, NY: Routledge: 117-130.

DO-IT (Disabilities, Opportunities, Internetworking, and Technology). (2015). Applications of universal design in postsecondary education. Center for Universal Design in Education. University of Washington. http://www.washington.edu/doit/programs/center-universal-design-education/applications-universal-design-postsecondary-education.

Dukes, Lyman (2014). Closed Captioning Matters: An Examination of the Use of Captioning for all Students. Retrieved from the Postsecondary Training Institute conference in Philadelphia, PA.

Fichten, C. S. (1986). Self, other, and situation-referent automatic thoughts: Interaction between people who have a physical disability and those who do not. *Cognitive Therapy and Research*, 10(5): 571-587.

Flaherty, C. (2017, September 15). A hill to retire on? *Inside Higher Ed*. https://www.insidehighered.com/news/2017/09/15/atmospheric-scientist-illinois-leave-after-refusing-provide-lecture-slides-student.

Fonosch, G. and Schwab, L. O. (1981). Attitudes of selected university faculty members toward disabled students. *Journal of College Student Personnel*, 22(3): 229-235.

Frijda, N. H. (1986). *The Emotions*. Studies in Emotion and Social Interaction series. Cambridge, UK: Cambridge University Press.

Gardner, H., & Davis, K. (2013). *The App Generation: How Today's Youth Navigate Identity, Intimacy, and Imagination in a Digital World*. New Haven, CT: Yale University Press.

Gaylord, V., Johnson, D. R., Lehr, C. A., Bremer, C. D. & Hasazi, S. (Eds.). (2004). *Impact: Feature Issue on Achieving Secondary Education and Transition Results for Students with Disabilities, 16*(3). Minneapolis: University of Minnesota, Institute on Community Integration. http://ici.umn.edu/products/impact/163.

Houck, C. K., Asselin, S. B., Troutman, G. C., and Arrington, J. M. (1992). Students with learning disabilities in the university environment: A study of faculty and student perceptions. *Journal of Learning Disabilities*, 25(10): 678-84.

Institute for Human Centered Design. (2016). History of Universal Design. Boston, MA: IHCD. http://www.humancentereddesign.org/universal-design/history-universal-design.

Lewin, T. (2015). Harvard and MIT are sued over lack of closed captions. New York Times. Feb 12. http://www.nytimes.com/2015/02/13/education/harvard-and-mit-sued-over-failing-to-caption-online-courses.html.

Lombardi, A. R. and Murray, C. (2011). Measuring university faculty attitudes toward disability: Willingness to accommodate and adopt universal design principles. *Journal of Vocational Rehabilitation*, 34(1): 43-56.

Losh, E. (2014, June 14). Education's war on Millennials: Why everyone is failing the "digital generation." *Salon*. http://www.salon.com/2014/06/14/educations_war_on_millennials_why_everyone_is_failing_the_digital_generation/.

Mason, K. C. (August 25, 2014). Colleges adjust to new reality that more students juggle work, family. PBS NewsHour. http://www.pbs.org/newshour/updates/colleges-adjust-to-new-reality-that-students-juggle-work-family-more/.

Meyer, A. , Rose, D., and Gordon, D. (2014). *Universal Design for Learning: Theory and Practice*. Wakefield, MA: CAST.

Murray, C., Lombardi, A., and Wren, C. (2011). The effects of disability-focused training on the attitudes and perceptions of university staff. *Remedial and Special Education*, 32(4): 290-300.

Murray, C., Lombardi, A., Wren, C. T., and Keys, C. (2009). Associations between prior disability-focused training and disability-related attitudes and perceptions among university faculty. *Learning Disability Quarterly*, 32(2): 87-100.

Nelson, J., Dodd, J., and Smith, D. (1990). Faculty willingness to accommodate students with learning disabilities. *Journal of Learning Disabilities*, 23(3): 185-189.

Palfrey, J. & Gasser, U. (2008). *Born Digital: Understanding the First Generation of Digital Natives*. New York, NY: Basic Books.

Rapp, W. H. and Arndt, K. (2012). *Teaching everyone: An introduction to inclusive education*. Baltimore, MD: Brookes Publishing.

Robinson, P. A., dir. (1989). Field of Dreams. Los Angeles, CA: Universal Pictures.

Schwab, C. (2015). The Innovator of Universal Design, Mr. Ron Mace Explained Differences between Universal Design and Barrier Free in 1989. http://www.accessiblehealthhome.com/2015/10/09/the-father-of-universal-design-mr-ron-mace-explained-differences-between-universal-design-and-barrier-free-in-1989/.

Stodden, R. A., Brown, S. E., and Roberts, K. (2011). Disability-friendly university environments: conducting a climate assessment. *New Directions for Higher Education*, 1(154): 83-92.

Tobin, T. J. (2014). Increase online student retention with Universal Design for Learning. *Quarterly Review of Distance Education* 15(3): 13-24. http://www.engl.duq.edu/servus/cv/QRDE.UDL.Article.pdf.

Zhang, D., Landmark, L., Reber, A., Hsu, H., Kwok, O., and Benz, M. (2010). University faculty knowledge, beliefs, and practices in providing reasonable accommodations to students with disabilities. *Remedial and Special Education*, 31(4): 276-286.