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Gaps in Understanding the Professional Development Needs of Postsecondary CTE Educators: Universal Design for Learning (UDL) as a Viable Solution

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Abstract

Professional development (PD) is a high-leverage strategy that can increase student success as well as teacher confidence and self-efficacy. Universal Design for Learning (UDL) is proven effective in preparing postsecondary instructors to meet the needs of a wide range of learners and can positively impact individual teachers' perceptions of their own preparedness. This white paper calls out known gaps in the research and guidance on developing meaningful PD for postsecondary CTE teachers and makes the case for improving postsecondary CTE instruction and student outcomes by applying the lens of design thinking (UDL) to teaching and learning environments. The concept of designing experiences, programs, and products by considering the needs of individuals who face the greatest barriers is a well-known, proven strategy, used by nonprofits, governments (Rose, 2016) and companies—Nike (Martin, 2021), Pepsi, Toyota (Fabrica360, 2021), and Ikea (Shah, 2021). Examples of design thinking include curb cuts on sidewalks and captions on videos, which were designed with specific users in mind but turn out to benefit a much wider audience. UDL allows career and technical education (CTE) teachers to use a design thinking lens to create learning environments and programs that result in success for more learners, thereby actively improving their confidence and leading to a spiraling effect—resulting in more positive student outcomes.

Table of Contents

Introduction: Why this Paper and Why Now?

For the past five years, CAST's Postsecondary and Workforce Division has focused on demonstrating the usefulness and application of Universal Design for Learning (UDL) in workforce training and development. The division has undertaken a range of impactful initiatives, including:

- Collaborating with the U.S. Department of Labor to develop UDL-based pre-apprenticeship opportunities for youth with disabilities.
- Delivering UDL training to more than 450 postsecondary educators nationwide.
- Co-creating onboarding and training programs with tech industry leaders, such as Google and HubSpot.
- Providing UDL-based professional development for educators in secondary and postsecondary Career and Technical Education (CTE) environments.
- Leading research on the ways UDL can improve student outcomes in secondary and postsecondary CTE environments through projects funded by the National Science Foundation (NSF) such as: An Online STEM Career Exploration and Readiness Environment for Opportunity Youth (#1620904) and Biofab Explorer: Designing A Dual Enrollment Pathway to Careers in Biofabrication (#2202033).

As part of this work, CAST has had the opportunity to partner with Michigan's Department of Labor and Economic Opportunity Workforce Development Bureau (LEO-WD) to identify key factors influencing postsecondary CTE instructor recruitment, retention, and professional development. The initial goal of this project was to identify research on the professional development needs of postsecondary CTE teachers, as well as research-based guidance on how best to support them in effectively reaching and teaching the wide range of learners found in postsecondary CTE institutions across MI. Unfortunately, the team at CAST found very little research or guidance on this important topic. This white paper serves as a call to action, highlighting the challenges this gap in research poses on the retention and preparation of postsecondary CTE educators. Further, this paper points to

UDL-based professional development as a potential strategy for building CTE instructors' self-efficacy—a proven approach leading to improved student outcomes and supporting long-term teacher retention.

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The Current Situation

Postsecondary CTE as an Education & Workforce Development Strategy with an Increasingly Variable Learner Population

Career and Technical Education (CTE) serves as a critical pathway to middle- and high-wage careers, with 7.8 million secondary students and 3.3 million postsecondary students currently enrolled in innovative CTE programs (ACTE, 2025). The evolution of CTE in the United States reflects a growing commitment to align education with workforce demands, propelled by key legislative milestones. The reauthorization of the Carl D. Perkins Act in 2006 and the Workforce Innovation and Opportunity Act (WIOA, 2014) established a strong foundation for significant advancements in CTE. From 2013 to 2019, all 50 states collectively enacted over 900 policies related to CTE, demonstrating a nationwide effort to address the increasing demand for middle-skill jobs (Advance CTE, 2023). The 2018 reauthorization of Perkins, known as the Strengthening Career and Technical Education for the 21st Century Act (Perkins V, 2018), further underscores the federal government's strategic focus on CTE as middle-skill jobs—requiring postsecondary education or specialized training but not necessarily a four-year degree—are projected to make up 53% of all jobs (*Skills for Good Jobs: Agenda 2020*, 2020).

CTE programs not only prepare students for immediate workforce entry but also serve as a launchpad for further education by integrating academic and technical skills in ways that engage and motivate learners, resulting in increased pathways to careers. Additionally, by combining hands-on, real-world applications with rigorous academic content, CTE fosters deeper connections to core subjects such as mathematics, science, and English, often improving student outcomes in these areas. Research shows that CTE has statistically significant positive impacts on students' academic achievement, employability skills and college readiness (ACTE, 2025b). According to Dougherty (2018), "All estimates suggest that participation in a high-quality CTE program boosts the probability of on-time graduation from high school by 7 to 10 percentage points for higher income students, and suggestively larger effects for their lower-income peers" (p. 119). This engagement stems from the relevance and practicality of CTE courses, which help students see the direct connection between their education and future career aspirations, creating a strong foundation for lifelong learning and academic success.

Postsecondary CTE programs are instrumental in meeting the demand for a skilled workforce at local, state, and national levels. These programs not only position students to continue to further education but also connect education and employment by equipping learners with industry-relevant skills, certifications, and practical experiences, preparing millions annually for high-skill, high-wage, and in-demand careers across industries such as healthcare, construction, and manufacturing (ACTE, 2025b). States like Michigan and Texas have made significant investments in expanding CTE pathways to support critical industries, such as automotive manufacturing and energy production (Advance CTE, 2023). Through collaborations with employers and industry organizations, CTE programs establish a robust pipeline of skilled workers, strengthen economic resilience, and address disparities in workforce participation, particularly for underrepresented populations like individuals with disabilities and English learners. On a national scale, Perkins V and WIOA have further integrated CTE into broader workforce strategies, ensuring these educational programs align with labor market needs and remain adaptable to emerging industries and technologies (Perkins V, 2018; WIOA, 2014). These efforts emphasize the central role of CTE in driving workforce readiness, economic growth, and national competitiveness.

At the same time, the demographic composition of postsecondary classrooms is becoming increasingly diverse, encompassing a wider range of racial, ethnic, socio-economic, and ability backgrounds. Over the past decade, the proportion of White students in higher education has declined from 66.8% in 2011 to 55.5% in 2022, while Hispanic student enrollment has risen from 11.2% to 18.5%. Black or African American enrollment has remained relatively stable, slightly decreasing from 11.3% to 10.8% during this period (Hearn, 2024). Notably, the percentage of community college students identified as having disabilities has doubled in recent years, reaching 24% (NCES, 2024). Additionally, there are differences in the makeup of students enrolling in CTE courses, too. For example, Anderson et al. (2021) report that "CTE students were slightly more likely than all students in community and technical colleges to be male, Black, or Latinx, and to be older than 23," (p. 6); and students from low socio-economic backgrounds are overrepresented in CTE, while in certain CTE programs gender imbalances persist.

These demographic shifts reflect broader societal changes and highlight the urgent need for postsecondary institutions to adopt effectual teaching practices tailored to the unique needs of all students. The persistent employment gap between individuals with disabilities and their non-disabled counterparts—22.5% compared to 65.8% employed—further underscores this necessity (*USDL-24-0349*, 2024). CTE instructors' attitudes and understanding of disability significantly influence students' academic and employment outcomes (Nachman, 2024). To ensure rigorous academic outcomes and career success, professional development for CTE educators must be adequately prepared to foster learning environments that effectively support all students.

Postsecondary CTE Teachers: Experts from the Field, Novices in the Classroom

The majority of postsecondary CTE faculty enter the classroom through alternative certification programs with little or no pedagogical training (Berry et al., 2008; McCaslin & Parks, 2002; Pogliano, 2008). While hired for their industry expertise, their relative deficit of teaching skills positions new

faculty in a potentially precarious spot. Shifting from expert status in one field (industry or trade) to novice status in another (teaching) can be disorienting and demoralizing.

While some who change careers bring knowledge of how to achieve these CTE-specific goals with them, many do not. In addition, having not been in the classroom for sometimes 10-20 years and having not gone through pedagogical training, some CTE teachers will bring perceptions of teaching and learning that do not reflect current theory and best practice (Varadharajan et al., 2020). Research shows that the perceptions and needs of traditionally prepared educators vs. those of career changers, or alternatively certified teachers, vary greatly (Linek et al., 2012); and that the perceptions about teaching and learning can have disproportionate (Plotner et al., 2023) impacts on specific populations of learners (i.e., students with disabilities and English learners), causing educators to report struggles with classroom management or assessment, and ultimately slowing the development of their teacher identity and self-efficacy.

According to Scott (2014), CTE teachers' success in the classroom depends equally on their trade skills and pedagogical skills. Career changers' existing expertise and professional self-efficacy can be a source of strength for persisting through the social and emotional challenges of managing the transition from expert in one domain to novice in a new domain (Katz et al., 2011; Laming & Horne, 2013; Leshem, 2019; Rodrigues & Mogarro, 2019; Shwartz & Dori, 2020; Smetana & Kushki, 2021; Troesch & Bauer, 2017; Varadharajan et al., 2020; J. Williams, 2010).

New career and technical education teachers often are making a conscious choice to leave active practice of their vocation when turning to teaching. Such a choice, coupled with the understanding of what it takes to develop expertise, not only positions CTE teachers for successful transition, but also informs the types of support they most likely need to accelerate their success. For example, research in adult learning theory underscores the importance of tailoring PD to meet the needs of teachers, who are themselves adult learners, emphasizing the key features such as relevance, practical application, and problem-centered approaches.

Professional Development Needs of Postsecondary CTE Educators

As described earlier, CAST is working with Michigan's Department of Labor and Economic Opportunity – Workforce Development Bureau (LEO-WD), to identify the professional development needs of postsecondary career and technical education (CTE) teachers. During Year 1 of this multi-year project, the team conducted a gap analysis and literature review, in addition to forming a state-wide advisory board made up of postsecondary CTE administrators and teachers from across Michigan. The literature review sought to identify current best practices of professional development for postsecondary CTE teachers. While not completely exhaustive, the review of literature included searches in EBSCOhost databases, including Education Source Ultimate, Communication Source, eBook Collection, eBook Subscription Diversity & Ethnic Studies, and Ethnic Diversity Source. The search extended to publicly available websites of local, state, and national-level organizations and government agencies. The primary finding from the review of literature was a general lack of research specific to professional development for postsecondary CTE teachers. As another part of the work with LEO-WD, one-to-one interviews and meetings with key advisory board members revealed some consistent and related themes around the professional development needs of postsecondary CTE educators. For example, nearly all participants identified gaps or needs related to onboarding, student assessment, strategies for supporting students with disabilities (SWD), classroom management, and program-specific professional development. Like other CTE educators who perceive much of the professional development they experience as irrelevant (Rivera, 2024), CTE educators in Michigan were hungry for professional development opportunities that felt useful *in their contexts*.

To support CTE educators, designers of PD should consider that in addition to a lack of formal pedagogical training, most postsecondary CTE instructors are singletons with no access to an educator/peer teaching the same content, are often supervised by administrators with no CTE background, and (in the case of postsecondary institutions specifically) may have very limited opportunities to observe and learn from other colleagues. And yet, many are (or have been) expected to teach effectively, only days after leaving their industry. The findings from Michigan, along with the

limited national literature, highlight three key needs, which should be considered when designing professional development for postsecondary CTE educators:

1. **Collaboration:** CTE educators need opportunities to share their expertise, learn from one another (McKendree & McKim, 2021), and connect with business and industry experts (Arnett-Hartwick & Cannon, 2020; Easterly Iii & Myers, 2017; Fletcher Jr. & Tyson, 2017; McKim et al., 2018; L. H. Williams, 2019).
2. **Value:** Postsecondary CTE educators need *tangible strategies*—such as how to establish safe lab environments and/or develop work-based learning opportunities (Moore-Kriwox & Cannon, 2024; Nachman, 2024)—that are effective for a wide range of learners within the context of CTE.
3. **Personalization:** Help CTE teachers understand the value of best practices and research-based teaching and learning strategies (Carballo et al., 2021; Moriña & Carballo, 2017) by offering support and training that meets the *unique* needs of each individual CTE teachers, as needed; this may include asynchronous online modules, coaching and/or mentoring (Kistler & Dougherty, 2024; Seay, 2021; Zirkle et al., 2019).

These insights underscore the importance of creating professional development opportunities that not only build teaching skills but also boost instructors' feelings of confidence in the classroom.

Teacher Self-Efficacy and Student Success are Intertwined

Considering the professional development needs of postsecondary CTE teachers—alongside the importance of CTE in workforce development, time constraints, limited research on effective PD strategies, and the growing variability of learners—it is essential to prioritize approaches that enhance teachers' skills and knowledge in effectual teaching practices. One effective (research-based) way to do this is to focus on PD that builds educators' self-efficacy. Teacher self-efficacy is a teacher's belief in their ability to help students learn, even when it is difficult; this self-perception influences teachers' behavior and choices, especially how they respond to challenging situations. By focusing on increasing teacher self-efficacy and confidence in addressing the needs of diverse learners, professional development can significantly improve classroom preparedness and, ultimately, student outcomes.

Teacher self-efficacy grows through positive mastery experiences, which encompass not only high-quality teaching and learning performance but also observable student success. When teachers see their efforts lead to meaningful academic performance and student achievement, their belief in their own abilities is reinforced. This belief enables them to design and deliver relevant, impactful curricula. As teachers witness their skills contributing to their students' success, their self-efficacy strengthens—creating a cycle in which success leads to further success.

Building teacher self-efficacy is not only vital for individual professional growth but also directly linked to student achievement. Research consistently highlights mastery experiences as a key source of teacher self-efficacy and establishes professional development as a critical mechanism for fostering these experiences. By aligning professional development with strategies that enhance teachers' confidence and capacity to support all learners, institutions can advance both educator effectiveness and student success.

This section summarizes teacher self-efficacy and mastery experience as its primary source, links teacher self-efficacy to student achievement, and reviews literature connecting professional development to teacher self-efficacy.

Teacher Self-Efficacy

Teacher self-efficacy research began in the 1970s when Los Angeles commissioned an evaluation of policies and factors that contributed to raising literacy scores of inner-city children (Armor et al., 1976). "Teachers who felt efficacious" (1976, p. vi) surfaced as one of the three most significant factors. Based on Bandura's (1997) concept of self-efficacy, teacher self-efficacy is described as a belief in one's ability to positively impact student learning and success (Denzine et al., 2005; Tschannen-Moran & Hoy, 2001). A teacher's actual abilities are not the same as their belief in their abilities. Alignment between the two is dependent on an array of self-awareness factors and is not a specific focus of this paper. Self-efficacy exists to varying degrees in every teacher, regardless of experience or ability. Where does the belief in one's abilities come from?

Sources of Teacher Self-Efficacy

Bandura (1997) identified the sources of self-efficacy this way: "Efficacy beliefs are the product of cognitive processing of diverse sources of efficacy information conveyed inactively, vicariously, socially, and physiologically" (p. 115). Elaborating on the first source of self-efficacy, he wrote:

> Enactive mastery experiences are the most influential source of efficacy information because they provide the most authentic evidence of whether one can muster whatever it takes to succeed. Success builds a robust belief in one's personal efficacy. Failures undermine it, especially if failures occur before a sense of efficacy is firmly established (p. 80).

Over two decades of research support Bandura's proposition that mastery experiences are the most influential of the four sources of self-efficacy (Tschannen-Moran & Hoy, 2007; Usher & Pajares, 2008; Yada et al., 2019; Zee & Koomen, 2016). In the postsecondary CTE lab and classroom, student successes following effective delivery of thoughtfully designed learning activities are enactive mastery experiences for the teacher. While student performance measures, i.e. grades, are markers of student success, they alone are not mastery experiences for teachers. In fact, Bandura warned about "serious conceptual problems [that] are created when a performance is misconstrued as the outcome itself" (1997, p. 22). Overall student success is an outcome of achievement earned by the students and learning activities designed and delivered by the teacher. The student success outcomes and the learning activities supporting those outcomes are those mastery experiences with the strongest impact on teacher self-efficacy.

Teacher Self-Efficacy Spiral

The literature holds a growing body of evidence linking teacher self-efficacy and student achievement (Bray-Clark & Bates, 2003; Gale et al., 2021; Love et al., 2020, 2020; Shaughnessy, 2004; Zee & Koomen, 2016). Like a self-fulfilling prophecy, teachers who believe in their ability to make a difference for their students' success tend to make that difference come true. Their students' success validates and reinforces their self-efficacious beliefs and thus deepens their teacher self-efficacy. Figure 1 offers a graphic representation of the teacher self-efficacy spiral.

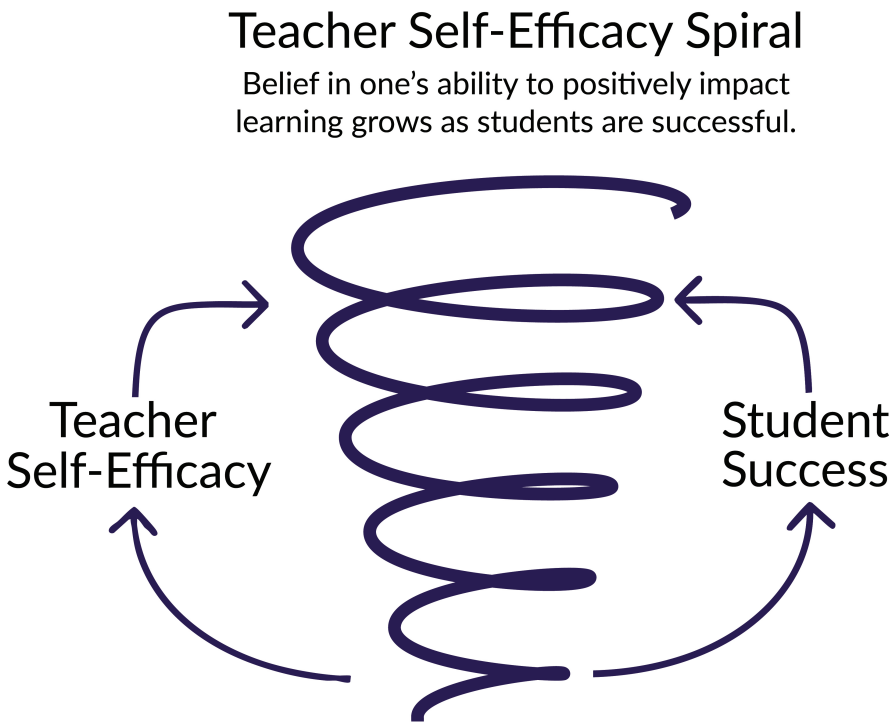

Figure 1. Teacher Self-efficacy Spiral. Student success is a significant mastery experience influencing growth of teacher self-efficacy.

The circular nature of a spiral reflects, albeit simply here for conceptual clarity, the cyclic nature of teaching and learning: curriculum design and instruction delivery followed by student performance and assessment. Reflective teachers intuitively pay attention to that cycle and adjust curriculum and instruction to increase student performance. Increased student success validates the adjustments as well as teacher self-efficacy. While reflective teachers can, even without supportive interventions, grow their own spiral through trial and error, there must be a way to accelerate that growth.

Professional Development Impact on Teacher Self-Efficacy

If student success is a mastery experience helping buoy teacher self-efficacy, then how can an institution foster and develop self-efficacy among its faculty members? The readily available tool for this task is professional development.

Professional Development Improves Teacher Self-Efficacy

Institutions turn to professional development as the front-line strategy for building capacity among their teaching staff. A growing body of evidence indicates professional development increases teacher self-efficacy (Bray-Clark & Bates, 2003; Choi & Lee, 2020; Harvey et al., 2020; Kelley et al., 2020; Lazarides & Warner, 2020; Martin et al., 2008; Overbaugh & Lu, 2008; Yang, 2020; Yoo, 2016). Many studies found positive relationships between professional development and teacher self-efficacy regardless of setting, subject matter, or teacher and student demographics. Focusing on multicultural classrooms, Choi & Lee (2020) found that not only does professional development "significantly help teachers develop their TSMC [teacher self-efficacy in multicultural classrooms]," but also the impact of professional development "is not exclusive to specific regional boundaries but also holds in different educational contexts" (Choi & Lee, 2020, p. 11). Nachman (2024) investigated the perceptions of strategies that could be used to improve the experience of students with disabilities in postsecondary classrooms. "What these studies show is the utility of systematic and tailored professional development around disability for faculty to change their conceptions and teaching approaches" (Nachman, 2024). Harvey et al. (2020) found that professional development can increase CTE educators' confidence for designing learning experiences for students with disabilities. According to Bray-Clark & Bates (2003), "There is also substantial research indicating that the self-efficacy construct can provide schools and staff development specialists with the tools they need to design effective teacher training, improve teacher competence, and by extension enhance student outcomes" (2003, p. 19).

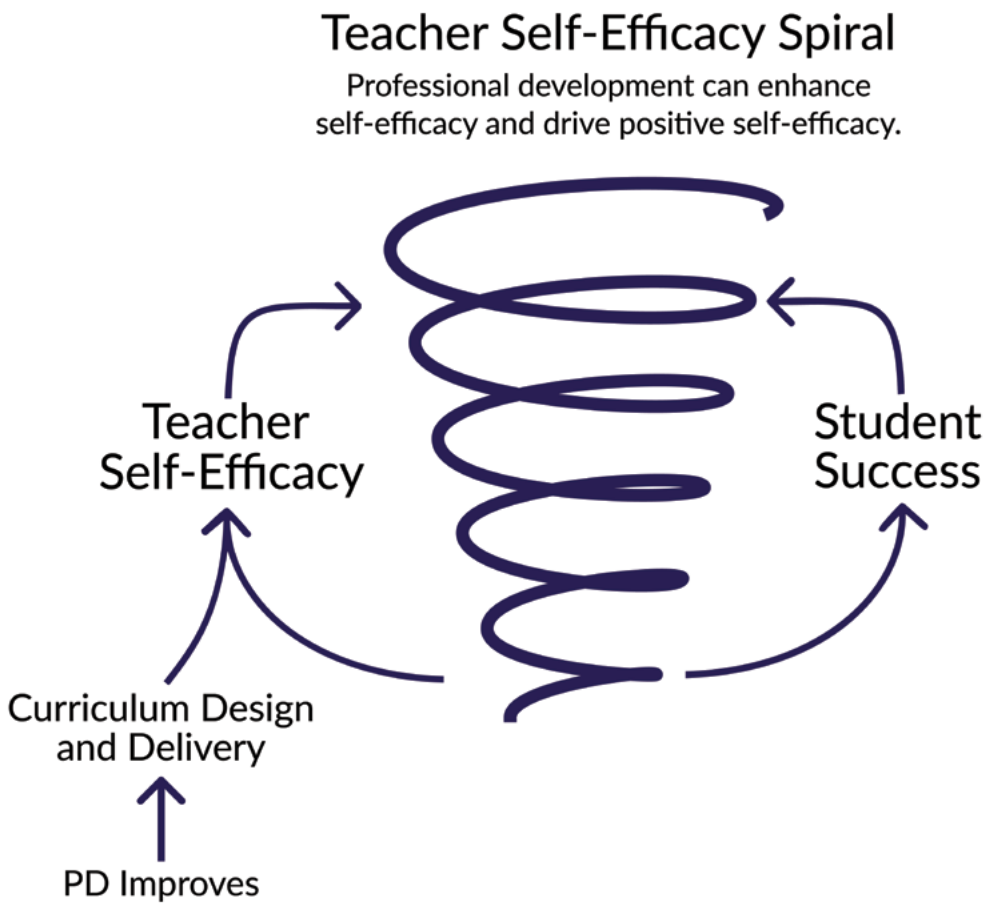

Figure 2. PD-enhanced Teacher Self-efficacy Spiral. PD can improve curriculum design and instruction delivery by adding another driver to the teacher self-efficacy spiral.

Summarized in Figure 2, professional development is an additional factor driving the teacher self-efficacy spiral. A teacher can grow their capacity by engaging in professional development activities, applying their new understandings to design, and delivering higher quality curriculum and instruction. The improved curriculum and instruction can increase student success. Both mastery experiences—higher quality teaching and learning in the lab or classroom and increased student success—combine synergistically to increase teacher self-efficacy.

Of course, teachers can only devote so much time and energy to professional development activities, so how can institutions provide the biggest teacher self-efficacy bang for the professional development buck? Let's consider PD content that applies to the broadest range of students, who we know are growing in variability in a variety of ways.

UDL as a Professional Development Solution for Postsecondary CTE Educators

Of all the options available on the professional development menu, Universal Design for Learning (UDL) is an evidence-based option proven effective in a wide range of settings for a wide range of learners. UDL is a logical choice for postsecondary CTE institutions that intend to meet the needs of their teachers and accelerate their teachers' self-efficacy spirals.

What is Universal Design for Learning?

Universal Design for Learning (UDL) appears in several pieces of important federal education legislation including the Higher Education Opportunity Act (HEOA, 2008), the Every Student Succeeds Act (ESSA, 2015), and the Strengthening Career and Technical Education for the 21st Century Act (Perkins V, 2018). UDL also appears in the U.S. Department of Education's Ed Tech Developer's Guide (2015) and their National Education Technology Plan (2024). The federal legislation defines UDL this way:

> Universal Design for Learning (UDL) is a scientifically valid framework for guiding educational practice that — (A) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and (B) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient (HEOA, 2008).

Universal Design for Learning (UDL) is broadly applicable across all postsecondary career and technical education content areas. UDL guidelines "offer a set of concrete suggestions that can be applied to any discipline or domain to ensure that all learners can access and participate in

meaningful, challenging learning opportunities" (CAST, 2018). Those suggestions are grouped in three domains of Engagement, Representation, and Action & Expression, shown in Figure 3.

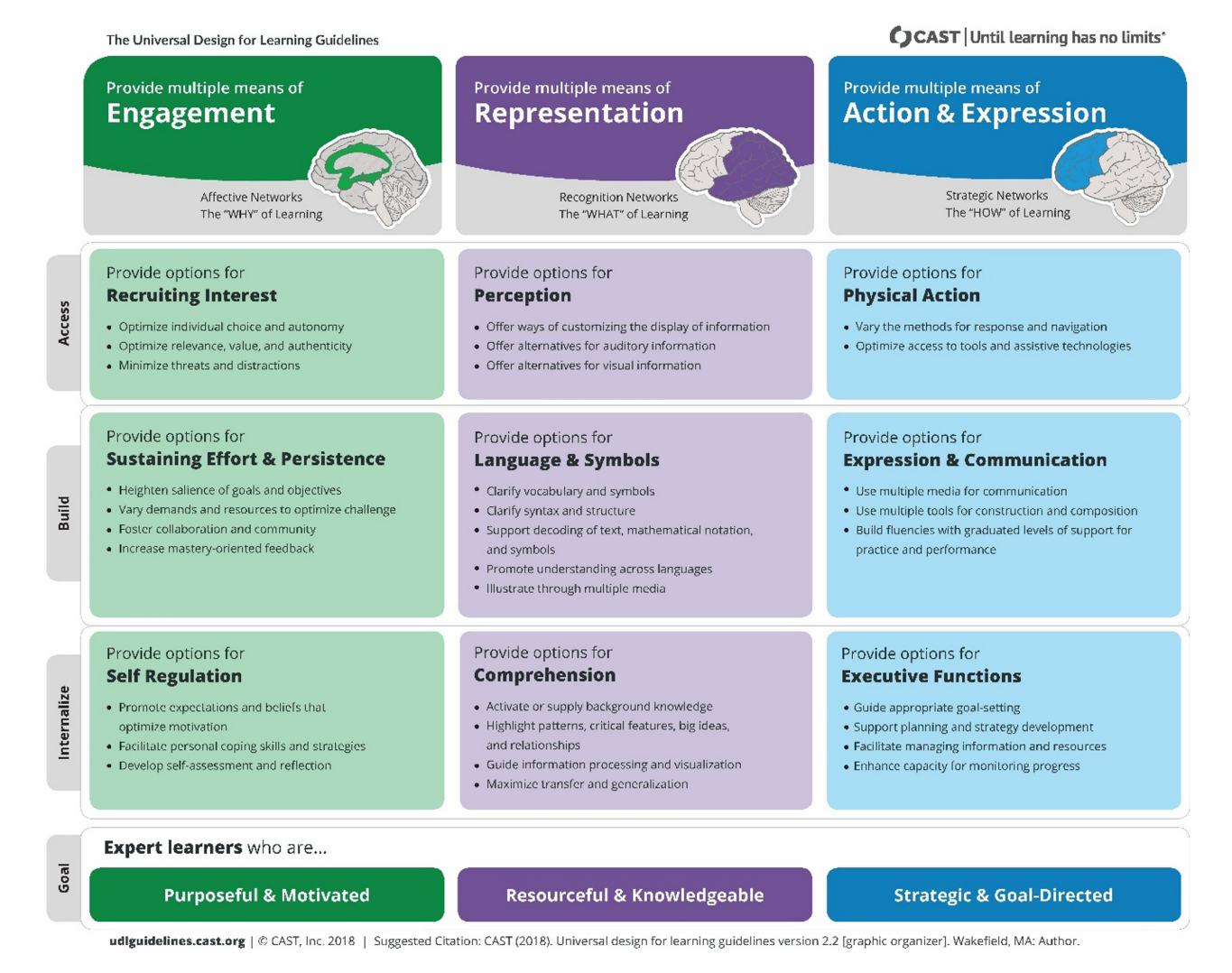

Figure 3. Universal Design for Learning Guidelines (CAST, 2018).

Universal Design for Learning (UDL) is proven effective in preparing postsecondary instructors to meet the needs of a wide range of learners, including those traditionally marginalized and most impacted by underprepared or unprepared educators (students with disabilities and multi-language learners) (Johnston & Posey, 2021).

When faculty participate in interactive, contextually based UDL professional development, they become more aware of when/how they are experiencing UDL strategies and heighten their use of UDL

when they are teaching (Johnston & Posey, 2021). For example, Bastoni et al. (2023) found that after UDL-infused training, teachers "noted that specific UDL strategies utilized in the training, including pause and reflect breaks, opportunities to share questions in the chat or aloud, audio descriptions of content on screen, and captioned videos, aided in their ability to understand and absorb the online content (p. 99). One participant noted in their post-training reflection, "I now use UDL to structure my lessons and note that students respond positively to the varied methods of engagement, improving their comprehension and GED® exam pass rates" (p. 99).

While UDL has been connected to a reduction in educational barriers for adult learners with disabilities, UDL also benefits neurotypical learners (Beardmore et al., 2022). In addition, UDL's learner-centered approach promotes both autonomy and self-directedness, two critical elements for adult learning (Rogers-Shaw et al., 2018).

Finally, UDL-based learning activities and materials can positively impact individual teachers' perceptions of their own preparedness (Fovet, 2020). A perception of preparedness is similar to the belief in one's ability to positively impact student learning and success; feeling prepared is another way to describe **teacher self-efficacy** (Denzine et al., 2005; Tschannen-Moran & Hoy, 2001).

Studies show that UDL PD improves educators' confidence in their ability to meet the needs of diverse learners, including students with disabilities, English learners, and those from underrepresented groups (Rao et al., 2014). Teachers who participate in UDL-focused training report greater feelings of preparedness and confidence in delivering flexible, accessible, and engaging instruction (Smith & Lowrey, 2017). These increases in self-efficacy can lead to better classroom management, improved instructional quality, and higher levels of student engagement and achievement. Bastoni et al. (2023) heard from a teacher in Southern Illinois sounding more confident when she shared, "Giving students options in Engagement, Representation, and Expression is so KEY!!!!! I cannot tell you how wonderful it is to see how engaged my students were today, due to the OPTIONS they had!" (p.100). Another reported, "I will definitely work to incorporate UDL guidelines when designing my educational programs. This really got me thinking about a lot of things that I hadn't considered before" (p. 99).

Research on UDL in higher education highlights its potential to transform postsecondary teaching practices. For instance, Park, Roberts, and Stodden (2012) found that faculty who participated in UDLfocused professional development demonstrated significant increases in their use of inclusive instructional strategies. This training enabled instructors to proactively design courses that address diverse student needs, resulting in reduced reliance on reactive accommodations. Furthermore, a study by McGuire-Schwartz and Arndt (McGuire-Schwartz & Arndt, 2007) reported that postsecondary instructors trained in UDL principles showed a greater understanding of how to engage all learners, leading to improved student outcomes. Such professional development empowers educators to adapt their teaching methods, fostering inclusive environments that benefit all students while simultaneously enhancing teacher confidence and competence.

The application of UDL principles not only increases teacher self-efficacy but also improves workforce and academic outcomes for a wider range of learners (Rao et al., 2014). For example, faculty who integrate UDL report higher levels of student engagement and satisfaction, as well as improved academic performance (Tobin, 2014). These findings underscore the reciprocal relationship between teacher self-efficacy and student success: as teachers gain confidence through mastery experiences enabled by UDL, their students benefit from more effective and equitable instruction.

The UDL-Informed Teacher Self-Efficacy Spiral

Universal Design for Learning is a flexible strategy, when applied to curriculum design and instruction delivery that can increase success for a broad range of students. Turning back to the teacher self-efficacy spiral, UDL can have a uniquely strong effect on the shape of that spiral. As a larger number of students realize greater gains in student success, a teacher's self-efficacy more quickly grows broader and deeper (see Figure 4).

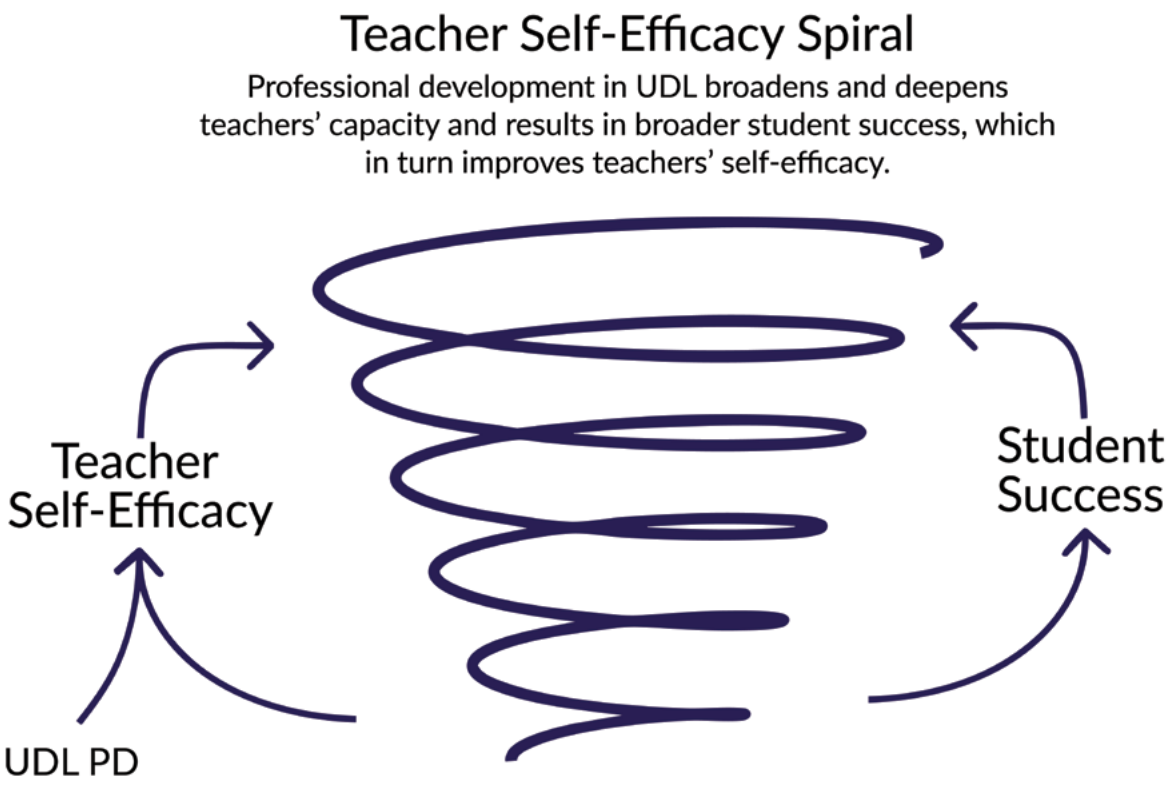

Figure 4. UDL-Informed Teacher Self-efficacy PD Spiral. Professional development builds teachers' capacity to design and implement high quality curriculum. When that curriculum produces student success, teachers' abilities are affirmed, and their self-efficacy grows. Professional development in Universal Design for Learning can broaden and deepen teacher capacity and, through resulting broader student success, teacher self-efficacy.

We argue therefore that Universal Design for Learning (UDL) is an excellent and cost-effective choice for postsecondary career and technical education institutions that want to achieve multiple outcomes including: 1) building faculty members' capacity to design and deliver high-quality curriculum and instruction and 2) increases success for a wide range of learners; which in turn validates teachers' belief in their own abilities, thus broadening and deepening their teacher self-efficacy.

From the Field: The Impact of UDL PD for CTE Educators

When delivering UDL-based PD for CTE educators, CAST trainers focus on designing learning environments and programs that consider the needs of learners who face the greatest barriers. Those designs often result in solutions that benefit a broader audience by enhancing accessibility, usability, and efficiency. This approach, called design thinking, is a proven strategy used by nonprofits, governments (Rose, 2016), and across the most profitable industries in the world—Nike (Martin, 2021), Pepsi, Toyota (Fabrica360, 2021), and Ikea (Shah, 2021). An impactful example of design thinking is the curb cut on sidewalks, which were originally designed for individuals using wheelchairs, but are now essential for a wider range of people such as parents pushing strollers, travelers wheeling luggage, and workers moving carts. Similarly, captions on videos that were designed to assist individuals with hearing impairments are now benefiting language learners and people in noisy environments. In career and technical education (CTE), framing teaching and learning through the lens of design thinking makes a positive impact on postsecondary CTE instructors' approach and confidence in the classroom.

- "Taking on a UDL mindset allows me to shift my priorities and focus more on what the students are actually learning and retaining, rather than simply getting through the instruction that I planned to cover that day." CTE Manufacturing and Woodshop Teacher, MT.

- "After this UDL training, I've been working with our adjunct CTE faculty looking for videos we can create that convey ideas that students repeatedly ask for help with. For example, describing a specific thing – like a specific safety concept for a machine – an idea students might not glean from the reading. We can turn that into a quick 1-minute video and then attach the video to a QR code on a machine so that students can access it any time. And we actually think this will improve outcomes for many students not just a specific group." Department Chair Advanced Manufacturing and Robotics at Manchester Community College in NH.

- "When I first started teaching, I generally believed that good teaching relied heavily on passionate delivery of content to students. After beginning my first teaching job, I began to realize that teaching and learning depended on **much more** than whether the teacher wanted to teach and the student wanted to learn. I had not understood the many types of diversity in what students were able to process or in how they were able to express what they knew, nor had I properly understood my own biases towards certain types of learning or methods of expression. Using UDL to broaden my own methods for presentation and for assessing student learning has increased student engagement in my classes." CTE business teacher.
- "Using more of a UDL format for things is helping me to be better organized so I can help my students to be better organized. For example, using UDL to set up my syllabus means the students have the reading for a specific module right away and they can see all the readings they need to do, and they don't have to guess or go all over the place looking for the readings. From my perspective, it's something I should have done four years ago for this class, and it would have made my life way easier. I think using UDL actually makes my job easier because I have less questions about where to find things." CTE adjunct teacher in Advanced Manufacturing at postsecondary level.

A Use Case Scenario: Designing Professional Development Modules for CTE Instructors Across the State of MI

Michigan is experiencing significant workforce shortages across various sectors, impacting the state's economic growth and productivity. A recent report indicates that 40% of small business owners in Michigan are facing challenges in recruiting and retaining quality employees (Detroit Regional Chamber, 2025). Shortages have been identified in key sectors including:

- **Skilled Trades:** There is a persistent shortage of qualified candidates in skilled trades, with 50% of tradespeople identifying this as a top challenge.
- **Healthcare:** Michigan has 85 available workers for every 100 open jobs, indicating a shortage in healthcare professionals among other sectors (Bebon, 2024).

- **Manufacturing:** The state is poised to see over 520,000 jobs in professional trades by 2030, yet the talent pool isn't keeping pace, affecting the manufacturing sector (Pohl, 2022).
- **Information Technology:** The rapid advancement in technology has led to a demand for IT professionals, with businesses struggling to find qualified candidates (Pohl, 2022).
- **Energy Sector:** The U.S. solar and storage industry, including Michigan, is facing growth constraints due to labor shortages, particularly in project management, engineering, and technical roles (Ford, 2024).

CTE programs in Michigan are pivotal in mitigating workforce shortages by providing students with the necessary skills and training to meet industry demands (Cates & Melhorn, 2024). These programs offer work-based learning experiences, aligning education with the needs of the labor market. CAST's work with LEO-WD is in part a reflection of the critical—and *recognized*—role that CTE programs play in developing a highly skilled, sustainable workforce in the state (Wheaton, 2025).

Preparing postsecondary CTE instructors and building teachers' self-efficacy—so they stay in the classroom and can effectively prepare the needed workforce—is one way MI is addressing these shortages. After conducting a gap analysis and surveying (45+) individuals and postsecondary partners across MI, CAST identified key professional development needs including: more training on curriculum design, classroom management, special populations, data usage, etc. To ensure validity and support dissemination, CAST convened a postsecondary CTE advisory board made up of educators and administrators from a range of postsecondary institutions.

- "Professional development for CTE faculty is sorely needed and often under-prioritized." Don Hutchinson from Macomb Community College.
- "Totally agree with all that was shared... especially supporting CTE teachers in pedagogy and practice." Krista McKinney-King, Wayne RESA.
- "Not overly surprised; although good to know others have/face same opportunities/ challenges/needs." Mark Dunneback, Kalamazoo Valley Community College.

Leveraging the findings from the literature review and gap analysis and working closely with the advisory board, CAST next began the development of PD modules that would be made freely available to Michigan educators, through CTE Learn—a platform for virtual professional development and free resources for Career and Technical Education (CTE) professionals. CTE Learn is a product of the Association for Career and Technical Education (ACTE) in alliance with MaxKnowledge and state partners. The development of these modules was informed by findings from a comprehensive gap analysis, literature review, and advisory board feedback conducted by CAST and LEO-WD. The team at CAST used UDL principles to develop modules specifically aimed at enhancing postsecondary CTE educators' confidence in addressing the needs of the wide range of learners they will encounter in their classrooms (Troesch & Bauer, 2017; Zee & Koomen, 2016).

- **Collaboration:** The modules were designed based on needs from the field and incorporate opportunities for educators to engage with other educators and reflect on their own teaching practices and communities of practice (McKendree & McKim, 2021). In addition, moving forward CAST will develop the resources needed so that instructors can work with LEO to author high-quality, UDL-aligned, program-specific PD, which will again connect to communities of practice and be made freely available to CTE educators across the state of MI.
- **Value:** Each module is tailored to reflect the real-world challenges CTE educators encounter, ensuring the training feels practical and immediately applicable to their classrooms (Rivera, 2024).
- **Personalization:** Designed for online delivery, the modules utilize best practices in remote learning, such as asynchronous options, clear entry and exit points, and content that is chunked into manageable sections for "just in time" access (Cook & Rao, 2018; Tang et al., 2021).

Modules Details

These UDL-based modules represent an innovative state-wide approach to providing professional development to postsecondary CTE instructors, equipping educators with the tools and strategies needed to meet the diverse needs of their students. By leveraging the evidence-based practices identified through CAST's work with LEO, the modules are designed to foster both educator confidence and improved student outcomes. Through the partnership with CTE Learn, CAST will be assessing and analyzing the impact of these modules, amplifying the potential impact of this approach on CTE education across the country. The first four modules CAST has developed for postsecondary CTE instructors across MI include:

- **Creating an Engaging CTE Classroom for All:** This module equips educators to implement UDL principles by creating learning environments where all students can thrive. It emphasizes strategies to recruit student interest, address barriers to learning, and amplify student voice and choice. By leveraging UDL, postsecondary CTE educators can build learning spaces that foster autonomy, creativity, and a sense of belonging for all.
- **Supporting Executive Functioning in CTE:** This module empowers educators to apply UDL principles to help any student with executive functioning challenges. Postsecondary educators learn how to help students set meaningful goals, overcome challenges, organize information, and monitor progress effectively. Participants explore practical strategies such as modeling goal setting, providing organizational tools, and engaging students in self-reflection to build independence and confidence.
- **Assessment Strategies for CTE Educators:** This module equips educators with the skills they need to design effective assessments and utilize formative assessments to address barriers and ensure assessments align with real-world skills and employability.
- **Strengthening CTE Instruction with Clear Learning Goals:** This module guides educators in leveraging Universal Design for Learning (UDL) to create, communicate, and support meaningful goals that drive student success. Through the module, participants explore strategies to craft clear, flexible learning goals, help students connect goals to real-world applications, and foster self-reflection and progress monitoring.

Next Steps

CTE programs are instrumental in workforce development, yet many educators face challenges stemming from insufficient pedagogical training, a lack of targeted professional development, and the growing variability of learners in their classrooms. These gaps impact teacher self-efficacy—a critical factor influencing both teacher retention and student success.

This paper outlines how UDL-based professional development can address these challenges. By equipping educators with inclusive teaching practices, UDL empowers them to design flexible, accessible, and engaging instruction that meets the needs of all learners, including those from underrepresented and historically marginalized groups. Teachers who engage in UDL-focused professional development report greater confidence in their abilities, improved instructional quality, and enhanced student outcomes. The findings presented emphasize the importance of mastery experiences and structured professional development in strengthening teacher self-efficacy. The reciprocal relationship between increased teacher confidence and improved student success creates a sustainable cycle of growth. By adopting UDL as a framework for professional learning, postsecondary institutions can better prepare CTE educators to meet workforce demands, improve access to training and education, and support the long-term success of both teachers and students. This paper serves as a call to action for stakeholders to prioritize UDL in the professional development of postsecondary CTE educators. Below are actionable recommendations and additional resources:

1. Implement UDL-Based Professional Development for CTE Instructors:
    a. Include hands-on workshops, real-world examples, and opportunities for educators to apply UDL principles in their course design and delivery.
    b. Leverage online and hybrid training models to ensure accessibility and flexibility for educators balancing teaching and other responsibilities.

2. Invest in Teacher Onboarding and Support:
    a. Create comprehensive onboarding programs for new CTE educators that incorporate UDL principles from the outset.
    b. Pair novice instructors with experienced mentors who can provide guidance on implementing inclusive teaching practices and navigating classroom challenges.
3. Establish Statewide Collaboration Networks:
    a. Facilitate the development of statewide advisory boards or professional learning communities where CTE educators can share best practices, resources, and strategies for UDL implementation.
    b. Promote cross-district and cross-institution collaboration to build a shared repository of UDL-aligned instructional materials and tools.
4. Promote Awareness:
    a. Share success stories and evidence of the impact of UDL-based professional development on educator self-efficacy and student outcomes.
    b. Champion policy changes at the state and federal levels to embed UDL as a standard in professional development for postsecondary CTE educators.
5. Conduct Research:
    a. Design and conduct studies to measure the effect of UDL-informed professional development for postsecondary CTE teachers on the success of their students.

Resources

- Add Universal Design for Learning to Your CTE State Plan: This resource encourages states to incorporate Universal Design for Learning (UDL) into their CTE plans to improve accessibility and engagement for all students, regardless of learning needs.
- Inclusive Strategies in CTE Courses Improve Student Engagement: This article identifies how using Universal Design for Learning (UDL) approaches in career-prep courses allows student choice for studying and demonstrating knowledge and improves outcomes.
- ACTE NextLevel Postsecondary CTE Fellowship: A leadership program designed to elevate postsecondary CTE professionals and improve the impact of CTE on workforce development and education.
- UDL Case Study: Cultivating a UDL Mindset: A case study showcasing how CTE and STEM educators can adopt a Universal Design for Learning (UDL) mindset to create accessible learning environments for all students.
- UDL on Campus: UDL Syllabus: This resource provides guidance on how to design a syllabus that integrates Universal Design for Learning principles to meet the needs of diverse learners in postsecondary education.
- Creating Accessible Documents: This document outlines best practices for making educational materials and resources more accessible to all students, especially those with disabilities, by using Universal Design for Learning principles.
- Using UDL to Design in Canvas: This guide focuses on how to implement Universal Design for Learning strategies in the Canvas learning management system to create flexible, inclusive, and accessible online courses.

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