GUIDE TO **UNIVERSAL DESIGN FOR LEARNING** IN

ENERGY & NATURAL RESOURCES

Powering Progress and Preserving Our Planet

CTE TECHNICAL ASSISTANCE CENTER OF NY

ABOUT THIS GUIDE

Universal Design for Learning (UDL) is a framework for designing learning experiences that are inclusive, accessible, and engaging for all students. UDL is not a checklist of required practices, but a mindset of continuous improvement. By increasing flexibility and options, UDL helps teachers proactively remove barriers, meet students where they are, and provide everyone with an equal opportunity to learn.

This document is part of a series that illustrates how UDL principles can be applied in each of Advance CTE's 14 career clusters. The series extends and tailors the tips provided in two prior publications, Supporting All Students in New York State CTE Programs [PDF] and Supporting Special Populations in New York State CTE Programs [PDF], available on the CTE TAC's website.

Photo: WSWHE BOCES

With its emphasis on relevant, authentic, hands-on learning, UDL is a natural fit for CTE classrooms!

5 REASONS WHY UDL WORKS FOR CTE ENERGY & NATURAL RESOURCES

1. Energy and Natural Resources combines theoretical knowledge with hands-on activities and practical applications. It offers **multiple modes of learning** and a variety of **authentic opportunities** for students to show what they know.
2. Outdoor learning presents unique logistical challenges. In addition, tasks can be physically demanding and technically complex. UDL ensures that **students with disabilities or other barriers to learning are appropriately included and involved** in fieldwork and hands-on activities.
3. Energy and Natural Resources involves **real-world issues** that affect all of us in our daily lives, making the subject **relevant to diverse students**.
4. By helping **students become better learners**, UDL builds critical thinking, collaboration, adaptability, and problem-solving skills that complement students' scientific knowledge and technical skills.
5. Today's energy and resource challenges require innovative solutions. By **emphasizing choice** and **providing a safe and supportive learning environment**, UDL encourages students to experiment and think outside the box.

QUICK REFERENCE GUIDE TO UDL FOR CTE

Universal Design is the process of creating objects, environments, and experiences that can be accessed, understood, and used to the greatest extent possible by people with a wide range of abilities, needs, and characteristics. Universal Design for Learning (UDL) applies the concept of Universal Design to learning contexts.

UNIVERSAL: UDL is a framework for **creating learning experiences that work for *everyone***. Proactively identifying and removing barriers to learning creates a more inclusive environment where all students have equitable opportunities to learn.

DESIGN: There is no one approach to learning that is optimal for every student in every situation. The UDL principles guide teachers to **plan for learner variability by offering flexibility and options**.

FOR LEARNING: Rather than a one-size-fits-all approach, **UDL empowers students to tailor the learning experience** for their individual needs, goals, and preferences. By discovering how they learn best, students develop into self-directed, resourceful, and skillful learners.

THE UDL PRINCIPLES*

	ENGAGEMENT	REPRESENTATION	ACTION & EXPRESSION
What is it?	The **WHY** of learning	The **WHAT** of learning	The **HOW** of learning
Why is it important?	Students differ in **what interests them** and **what motivates them to learn**.	Students differ in how they **perceive and make meaning from information**.	Students differ in how they **navigate learning environments and express what they know**.
What does it look like in practice?	Students engage in authentic, hands-on learning. Learning is relevant to students' identities, personal interests, and career goals. Students collaborate, co-create, and build community with peers. Students feel safe, included, and welcome. Fun and creativity are encouraged.	Course materials are accessible for all learners. Multiple media are used to present information. Language and symbols are clarified and decoded. The curriculum and course materials represent diverse individuals and perspectives. Learning is structured to help students build knowledge.	Learning activities and assessments are accessible for all learners. Students are guided to organize information, manage time, set goals, and plan their learning. Students communicate and express themselves in different ways. Students participate in class activities and demonstrate their learning in different ways.

** Abridged and adapted from the CAST UDL Guidelines.*

SAMPLE LESSON

Let's look at a sample lesson to see how the general principles described on page 2 can be applied in a CTE classroom.

Examples abridged and adapted from the lesson "Test and Treat Before You Drink" by Christie Chatterley, Kate Beggs, Malinda Schaefer Zarske, Janet Yowell, and Denise W. Carlson/University of Colorado Boulder: https://ctetac.us/energylesson

Key to abbreviations:
R = Representation, **A = Action & Expression**, **E = Engagement**

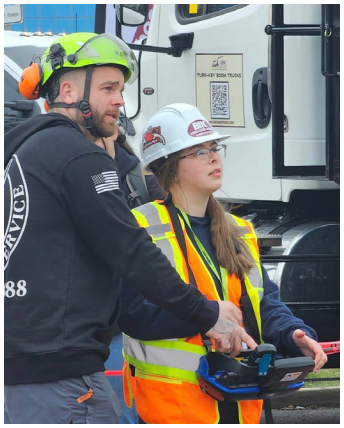

Photo: WSWHE BOCES

ELEMENT	WHY DOES IT WORK?	GO FURTHER WITH UDL
Learning goal: Students will be able to describe how to test for bacteria in water, compare and contrast small-scale water treatment options, and explain how water treatment technologies can save lives.	Allows teachers to envision multiple ways students can achieve and demonstrate learning **(A)**. Lesson objectives have real-world relevance to global environmental and public health issues **(E)**.	Share the learning objectives for each lesson with students to **set expectations and short-term goals (A)**. Identify the academic, Common Career Technical Core, and cluster-specific industry standards to explicitly **illustrate the lesson's relevance** to students' career goals **(E)**.
Bellringer/Warm-up activity Class attempts to correctly rank leading causes of death in developing countries and identify those related to water quality.	Supports collaborative learning **(E)**. Grabs attention by powerfully conveying the topic's real-world relevance **(E)**.	Collect responses using an interactive poll or quiz to **visualize results (R)** and offer **an alternative to oral participation (A)**. Facilitate activity in small groups to **deepen peer collaboration (E)** and **lower some barriers to participation (A)** (e.g., anxiety, language/speech differences). Have students write a brief reflection on the activity to **expand options for expression (A)**.
Brainstorming activity/ "Idea web" Class brainstorms causes, impacts, and possible solutions to water pollution.	Helps students identify patterns, relationships, and big ideas **(R)**. Represents verbal input in a visual format **(R)**.	Guide students to create mind maps or idea webs to **develop executive functioning skills (A)**. Introduce and enforce "rules of brainstorming" to **encourage effective, inclusive, and respectful peer interaction (E)**. Use a "think-pair-share" format to allow students to **process information verbally and in writing (A)**.

ELEMENT	WHY DOES IT WORK?	GO FURTHER WITH UDL
Lesson Teacher introduces five methods of small-scale water treatment.	Water Treatment Fact Sheets provide an alternative format and convey information using multiple media **(R)**. Offering digital documents in both PDF and Word format expands options to customize the display of information **(R)**.	Offering handouts in digital and printed formats **accommodates varying access to technology** and **supports the use of assistive technology (A)**. Provide a graphic organizer template to help students **consolidate and organize information (A)** and **record key takeaways (R)**. Replace part of the lecture with a "jigsaw" activity (i.e., small groups each review one handout and report their findings to the class) to **promote active learning (A)** and **enhance collaboration (E)**.
Vocabulary review game Students review key terms in a bingo-based activity that requires them to circulate throughout the classroom to interact with peers.	Supports comprehension and provides essential background knowledge **(R)**. Proactively addresses language barriers **(R)**. Novelty, fun, and creativity promote engagement **(E)**.	**Demonstrate the activity instructions** by completing one or two terms as a class ("free space") **(R)**. Preface the activity with **time to process information and/or prepare a memory aid (A)** (e.g., notecard) to **ensure all students can actively participate (E)**. Provide **inclusive alternatives to physical action** for students with mobility limitations **(A)**.
Homework: Find the Solution Students independently research other simple and low-cost water treatment solutions.	Students choose their own topics and sources **(E)**. Providing a "starter set" of resources scaffolds the activity and models expectations acceptable sources **(A)**.	Provide a rubric and/or written instructions to **clarify assignment guidelines (R)** and **support strategy development and planning (A)**. Allow students to complete the activity **independently or in teams (E)**. Offer a **choice of submission formats** (e.g., written paper, infographic, presentation, podcast) **(A)**.

TRY-IT ACTIVITY 1

Apply the framework above to one of the extension activities suggested in the lesson plan or another activity of your choice. Identify examples of UDL principle(s) and/or practices the activity addresses and propose two or three ways you could adapt the activity to go even further with UDL. Refer to the **UDL Principles** in the **Quick Reference Guide** on *page 2* for ideas.

EXTENSION ACTIVITY (CHOOSE 1)	UDL PRINCIPLES/PRACTICES ADDRESSED	WAYS TO GO FURTHER WITH UDL
"Engineering in Politics" discussion [see lesson plan]		
Hands-on activity to build or test simple water treatment systems		
Students present their independent research findings to the class		
Guest speaker		
Field trip or site visit to a water treatment facility		
Other:		

TRY-IT ACTIVITY 2

How could you make the lesson and/or extension activity more meaningful for the students in *your* CTE Energy & Natural Resources course by:

Tip: Refer to the table on page 6 for information on student demographics and special populations within CTE and CTE Energy & Natural Resources in New York State.

Ensuring students see images and examples of people like themselves working in energy and natural resources?

Addressing specific barriers they might encounter (e.g., disabilities, access to resources, language skills)?

Making the lesson or activity more relevant to their identities, interests, local context, and/or career goals?

WHO ARE OUR STUDENTS IN CTE ENERGY & NATURAL RESOURCES?

POPULATION	All U.S. CTE	All NYS CTE	NYS CTE AGRICULTURE, FOOD & NATURAL RESOURCES
Female	46.7%	42.6%	**56.0%**
Nonbinary	*no data*	0.1%	***no data***
Students of Color	51.0%	59.0%	**46.6%**
American Indian or Alaskan Native	*0.9%*	*0.8%*	***0.8%***
Asian	*4.6%*	*12.3%*	***10.5%***
Black or African American	*13.1%*	*13.9%*	***11.3%***
Hispanic/Latino	*28.0%*	*29.4%*	***21.5%***
Native Hawaiian or Other Pacific Islander	*0.4%*	*0.3%*	***0.2%***
Two or More Races	*4.0%*	*2.3%*	***2.4%***
Individuals from Economically Disadvantaged Families	45.3%	59.7%	**56.3%**
Individuals Preparing for Nontraditional Fields	24.3%	18.0%	**32.6%**
Individuals With Disabilities (ESEA/IDEA)	10.7%	18.6%	**23.4%**
Homeless Individuals	1.4%	3.5%	**3.0%**
English Learners	5.4%	3.5%	**2.1%**
Youth in Foster Care	0.2%	0.2%	**0.2%**
Youth With Parent in Active Military	1.0%	0.3%	**0.1%**
Migrant Students	0.3%	0.02%	**0.04%**

Sources: PCRN National Enrollment Profile, 2021-22; NYSED Enrollment Data, Secondary CTE Concentrators, 2022-23

GUIDED APPLICATION
GETTING STARTED WITH UDL IN CTE

Implementing UDL doesn't require special pedagogy or training. In fact, you're probably using UDL principles in your teaching without even knowing it! Here are a few ways you can build upon the good teaching you already do.

Complete a printed worksheet by hand or populate a digital copy to share with your principal, consultant teachers, or others who can support your UDL journey. If you share the sheet, don't forget to fill in your information below!

My name:

My CTE program(s) or course(s):

STRATEGY 1: IDENTIFY OPPORTUNITIES

For ***each*** of the three UDL principles, list one or two examples of strategies you're not currently using in your teaching, but you'd like to learn about or try. Indicate any resources, information, or support you need in order to be successful.

Refer to the **UDL Principles** in the **Quick Reference Guide** on page 2 for ideas.

ENGAGEMENT	REPRESENTATION	ACTION & EXPRESSION
[Example: I want to use polls or games to introduce lessons]	*[Example: I want to learn how to enable auto-captions in Google Slides]*	*[Example: I want to create graphic organizers to help students take notes]*
Resources required:	**Resources required:**	**Resources required:**

⚠ **Remember that UDL is not a checklist! You don't need to implement every practice to have a positive impact. Start with one or two small changes. See how they work for you and your students before adding others.**

STRATEGY 2: THE PLUS ONE (+1) APPROACH

Plus one (+1) means adding one option to each resource, activity, or assignment in a lesson or course, as appropriate. Start with options that require a minimal investment of your time and effort to build your momentum.

Choose a specific lesson or learning activity from your course. List each element of the lesson or activity, then propose a +1 for each element. Identify which UDL principle your +1 reflects and briefly explain how that principle is reflected.

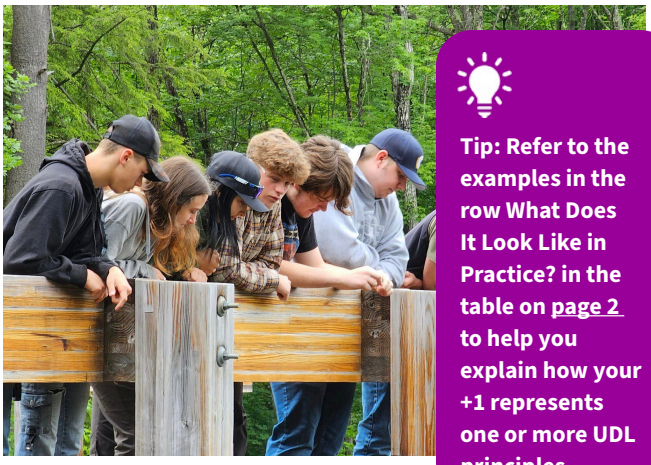

Photo: WSWHE BOCES

Tip: Refer to the examples in the row What Does It Look Like in Practice? in the table on page 2 to help you explain how your +1 represents one or more UDL principles.

For example:

- Add a short video to a traditional lecture for **multiple means of representation**.
  Bonus: *Make sure the video you select has captions or a transcript to double your impact!*
- Allow students to submit a video, podcast, infographic, or other creative product instead of a written essay, lab report, or research paper to provide **multiple means of action and expression**. Or, offer a choice of a multiple-choice quiz or an open-ended essay question to check students' comprehension.
  Bonus: *Foster critical thinking by inviting students to co-create assignment guidelines and grading criteria, propose quiz questions, and/or participate in peer assessment activities.*
- Offer **multiple means of engagement** by allowing students to choose whether to complete some learning activities individually or in teams. Or, let them choose their own topics and/or formats for assignments.
  Bonus: *Permitting a choice of formats is a UDL double-dip of boosting engagement AND providing options for action and expression!*

Lesson or activity title/topic:

WHAT YOU DO NOW	YOUR +1	WHICH UDL PRINCIPLE(S) DOES YOUR +1 REFLECT? HOW?