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# UDL

Universal Design for Learning: Reaching All, Teaching All



*Ultimately, educational goals will  
not be about the mastery of content,  
but about the mastery of learning.*

*Grace Meo*

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Sincerely,  
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# Universal Design for Learning: Reaching All, Teaching All

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## What UDL Is and Is Not

Universal Design for Learning (UDL) emerged from the field of architectural design when federal legislation required universal access to buildings and other structures for individuals with disabilities. Architects began to design accessibility into buildings during their initial design stage rather than retrofitting standing structures. Using this architectural principle, UDL is a strategy to eliminate barriers that students may encounter to learning.

Universal Design for Learning was a term coined by the Center for Accessing Special Technologies (CAST). UDL includes Universally Designed Instruction (UDI) as well as the concept of universally designed curriculum (UDC) and Universal Design in Assessment (UDA). Each of these concepts deals with the idea that education, in general, should be designed up front for access by all students, whether the curriculum, the instructional strategies, or the assessment. CAST found that the principles of universal design could be effective in developing useful educational tools (Meyer and Rose, 2000). A clear case has been made for the use of new technologies in the classroom today to ensure academic achievement for all students.

*Developing powerful technologies to overcome barriers must be balanced by designing environments with fewer barriers. The lesson of ADA (Americans with Disabilities Act) is that small affordances built in everywhere, like curb cuts and ramps, are as critical for access as are assistive technologies like motorized wheelchairs . . . The same is true for educational materials and methods. We need to use the new technologies not only to overcome existing learning barriers, but also to design learning environments with fewer barriers right from the start.*

*David Rose (2001, Testimony to Congress)*



Universal Design in education means that the physical, social, and learning environments are designed so that diverse learners (including diversity in the areas of culture, socioeconomics, gender, race, and ability) are supported through powerful possibilities for teaching and learning. Universal Design is a concept, a set of principles, a framework ... a frame of mind that supports designs be made accessible and usable for the widest possible number of individuals.

This includes:

- The built environment (e.g., homes, offices, buildings)
- Consumer products (e.g., writing utensils, hand tools, keyboards.)
- Technologies (e.g., computer access, the World Wide Web)
- Education (e.g., curriculum, instruction, assessment) (Curry, 2004)

Universal Design does not mean standards will be lowered. Universal Design is not achieved by uniformity, but rather by flexibility. Universal Design is a framework that provides alternatives to: methods of instruction; delivery of instruction; materials, and methods of student response (how students show what they know and can do) all within the general curriculum for every student, regardless of his or her specific areas of diversity.

UDL can be implemented using a variety of means, including digitized materials, such as text presented in a digital, electronic format. Often accessed by computer and sometimes using an electronic reader, students with learning differences (e.g., gifted or disabled) have immediate support and feedback. Students who are physically challenged are not limited by books they cannot hold. Students who have special talents are not limited by the bound book. Students with visual impairments can hear the same materials available to their peers or have almost immediate access to text in Braille. Flexibility is of utmost importance to accessing the benefits of Universal Design for Learning.

## UDL & the Link to Brain Research

Everyone has a somewhat different way of seeing and interacting with the world. Mild and moderate brain differences affect the way we learn (i.e., the way people need learning input – methods; need to engage in learning - materials and activities; and need to provide output of learning - response). Exciting advances in the area of brain research tell us that the ways students learn are not just student preference (i.e., auditory, visual, kinesthetic, or tactile learner), but brain driven - neurologically determined. Therefore, built-in flexibility in the design of curriculum, instruction, materials, and acceptable student response is paramount to quality education.

Based on brain research , new technological tools, and Universal Design for Learning, CAST has found that learning is distributed across three interconnected networks of the brain:

- Recognition network,
- Strategic network, and
- Affective network.

The way in which we recognize information, build factual knowledge, and relate new information to our prior knowledge (recognition network) determines, in part, how we learn. Everything we encounter involves a strategic process (strategic network) to identify, plan, and

execute an action. The manner in which we accomplish this, determines, in part, how we learn. Lastly, the way in which we attach emotional significance to objects and actions (affective network) partially determines how we experience educational environments, tasks, materials, instruction in our own distinctive manner. Taken together, these three networks form a complex framework that we can use to analyze patterns of individual student's strengths and weaknesses and understand their individual differences. Reiterated, recognition networks help us identify objects; strategic networks allow us to act on these objects; and affective networks attach emotional significance to these objects and actions, influencing what we see, do, and learn. (Rose & Myer, 2002)

This relatively new knowledge of the way human brains function substantiates what many excellent educators have "known" for decades; that allowing for learner differences does not give students an unfair advantage, a "crutch", but gives teachers the opening to "level the playing field" of education so that all students have the best opportunity to learn that we as a society can afford them.

## Benefits of Universal Design

**Cost:** A classic example of universal design in the area of architecture is the curb cut that was designed to increase mobility for persons in wheelchairs. This has become an essential means of mobility for bicyclers, roller bladers, shoppers with carts, parents with strollers, and others. You probably use universally designed products daily without a second thought. One may use the closed captioning to watch a movie in which the actors have a thick accent. Similar examples of the benefits of universal design abound such as automatic doors and lever handles. These have come to benefit persons with and without disabilities. Closed-captioned television included with televisions from the onset costs only a few cents rather than the several hundred dollars it previously cost when added afterward.

This same concept holds for UDL. Developing curriculum, materials, instruction, and assessments that incorporate universal design principles from the onset is a more sound economical practice than retrofitting. For example, time is spent more efficiently up front in developing a curriculum that is accessible by most students than by individual teachers retrofitting the curriculum for specific students on a weekly or even daily basis. The monetary cost of making inaccessible materials accessible for a small percentage of students can be exorbitant. For example, producing recordings of textbooks or scanning them into a digitized format for flexibility costs much more than receiving textbooks directly from the publisher in a digitized format.

❖ *UDL is good for teachers because planning ahead saves time and money in the long-run.*

***Provision of Access to All:*** Teachers want to teach all of their students. However when barriers are evident, they may see no choice other than asking a teacher with a smaller caseload to work with students who need special attention, whether they be gifted students or students with disabilities. Fewer students will need separate, time-consuming accommodations when materials are flexible. Examples of flexible materials include digitized text that can immediately be turned into speech or refreshable Braille, voice recognition software that allows students to express themselves orally, visual mapping software that supports a less traditional means of organization, interactive whiteboards that can turn text from the board into a digitized format, and captioning and described video.

All students deserve the opportunity to learn and are entitled to a curriculum and materials that accommodate various learning differences. Educators today can use the concept of UDL and the technology available to adjust instruction and materials rather than expecting students to adjust to the materials. This provides a foundation for equal educational opportunities for all students.

❖ *The UDL approach promotes a more inclusive environment for all students*

***Student Engagement:*** Research supports the fact that students are more motivated to learn when the work is at their instructional level. Challenge with support to achieve the end outcome is rewarding. Research is also clear that many students are more engaged in their work when it involves technology. When students are engaged and learning, their self-esteem and sense of self-efficacy are enhanced, thus they learn more.

❖ *UDL is good for students because it reduces frustration previously experienced with using inflexible print materials.*

***Legal Compliance:*** At work and in school, the Americans with Disabilities Act and the Individuals with Disabilities Education Act respectively, require information and activities to be accessible and usable by individuals with disabilities. UDL helps with legal compliance to these specific laws.

## UDL Lessons Learned

Schools that have implemented UDL for up to four years with extensive support from CAST have found positive changes in their schools and even recommend the infusion of UDL principles throughout college coursework for teacher candidates.



The following is a synthesis of what CAST-supported schools believe.

- ❖ Students have increased academic progress, motivation, and literacy scores on state tests.
- ❖ The classroom focus has changed to giving students access to the curriculum.
- ❖ Teachers are more satisfied in their work and believe that they have the skills necessary to teach all students.

These schools would do the following if they were starting over again:

- ❖ Have technology, hardware and software, in the school ready to go prior to implementation.
- ❖ Be certain that all teachers are comfortable with the technology.
- ❖ Have technology support staff in the building.
- ❖ Provide for ongoing technology and UDL professional development.
- ❖ Work with the excited teachers first.
- ❖ Develop a method for making each lesson "UDL friendly", such as collaboration with other schools; repository of quality lessons; and school partners to share ideas, resources, digitized text, and plans.
- ❖ Remember that some students may be learning technology at the same time that they are learning the new content.

## Implications for Teachers

Roles of teachers may change as they use more and more UDL principles. Teachers have always worked with a variety of learners, but now students have an increasingly wide range of learning needs that are very different, depending on the students' level of knowledge, skills, background, and experience. It will become imperative that special educators work closely with general educators in order to focus curriculum to meet the needs of students with unique learning needs.

The use of UDL minimizes teachers spending large amounts of time on alternate material because flexible/alternate formats will be available within the curriculum and technology. With these emerging technologies, educators now have a chance to assist with development of curricula which allows teachers to make choices about the mode in which information is presented and how students respond and demonstrate learning (Pisha and Coyne, 2001)

"Universal design for learning does not remove academic challenges for students; it removes barriers to access. Simply stated, universal design is just good teaching."  
(Ohio State University Partnership Grant, 2003)

## Implementation of UDL

Technology can make the learning environment dynamic and customizable. However, UDL is not limited to technology. Learning strategies and techniques such as, Big Ideas, Conspicuous Strategies, Mediated Scaffolding, Strategic Integration Model, Primed Background Knowledge, and Judicious Review are typical methods used in a universally designed classroom that are not technology based (Kame'enui, Carnine, Dixon, Simmons, and Coyne 2002). Three brief explanations and examples include:

1. **Big Ideas:** Strikes a balance between simply exposing students to the large amount of content and abandoning mandated learning outcomes for a rich learning environment. Teaching writing through planning, drafting, revising, and editing is a Big Idea. Likewise, teaching the processes of scientific inquiry is a Big Idea that allows students to bring other smaller ideas together and learn. Kame'enui, et al. give the example of story grammar in reading comprehension (2003). These elements include characters, a conflict, the attempt to resolve the problem, and a theme. Story grammar is a big idea because all stories have these elements in common . Teaching students to attend to each of these can enhance comprehension.

2. Scaffolding is a temporary support with a gradual release as the student acquires more experience and skill. For example, the use of concept maps serves to make connections between ideas more obvious (i.e., conspicuous strategies), and also supports the learner in bridging familiar, well-established concepts with unfamiliar ones (Kame'enui, et al.).
3. Strategic Integration: Some knowledge integrates naturally within a discipline (e.g., mathematics) or across them. Identification of those naturally occurring relationships (e.g., addition and multiplication or phonics and spelling) allows teachers to integrate each concept with the other in a meaningful, thoughtful, and planful way. Each new concept must be introduced, scaffolded, practiced, and assessed before the next new concept is introduced and eventually integrated. Kame'enui, et al. give the example of the concept of density. Density may be taught first, the scaffolding removed, and practice given using the concept in the context of teaching about the effects of heat on density. A related concept called Strategic Instruction Model comes from the University of Kansas ([www.ku-crl.org](http://www.ku-crl.org)).

These strategies and others can aid any student by allowing them to more fully participate in the common core of educational opportunities needed for all students to achieve success in school. For example, a universally designed keyboard should be easy to use, because the educational goal is not to use a keyboard, but to express a thought. The keyboard should not add more barriers. Grace Meo from the National Center for Accessing General Curriculum expresses this concept in this manner:

The athlete lifts weight to build muscle; the professional mover uses a dolly to carry heavy objects. The learner more resembles the athlete than the professional mover. Education requires challenge and resistance, and Universal Design for Learning requires careful attention to the goals of any given learning experience – Is the goal to write a story or to create a narrative? Is the instruction to write your name at the top of the paper or to identify your work? (Personal communication, April 8, 2003)

## UDL Example and Non-Example

### *Scenario One:*

Ms. Smith's fourth grade class is completing a lesson on division of whole numbers. Her class is quietly listening while she stands in front of the room and provides examples on the chalkboard on how to complete division problems. The students are instructed to complete 10 division problems on their own.

**Question:** Does Ms. Smith use UDL principles in this lesson?

**Answer:** No. Ms. Smith did not provide sufficient examples of critical concepts and it is difficult to follow her lesson by listening, watching the examples on the board and taking notes. It will be difficult for some children to see the board, to write legibly and quickly in order to review, or to follow by listening and watching.

**Possible Revision:** Ms. Smith could use an interactive whiteboard to print out copies of her examples for students who need this support.



***Scenario Two:***

Mr. Jones' fourth grade class is completing a lesson on division of whole numbers. Mr. Jones provides examples on how to solve the problems. He uses the interactive whiteboard for one example and toothpicks for the second example. There are 10 division problems for students to complete. Several students use the computer, other students use toothpicks, while others are working in pairs on interactive whiteboards to solve the problems.

**Question:** Does Mr. Jones use UDL principles in this lesson?

**Answer:** Yes. Mr. Jones utilizes several methods to instruct the students on how to complete the problem and allows students several different ways to attempt their 10 problems. A student with a vision challenge could use the dry erase board with a friend and have the problem in a larger size, print it out, and turn it in to the teacher. A student who had difficulty writing legibly, which often causes students to miscalculate, is able to use the computer. A student who has not grasped the essential concepts for solving division is able to practice using manipulatives and through peer tutoring.

In a UDL curriculum, many adaptations are subtle, almost invisible when integrated into the design. UDL features that can be useful to almost everyone may be implemented in a way that makes them more openly available for general use. Just as curb cuts improve access for everyone, curricula and materials that embrace the elements of UDL can be expected to improve outcomes for all learners. (Pisha and Coyne, 2001)

### *Other Implementation Ideas:*

For most learners, in order to achieve optimal learning, instruction, materials, and assessment must address each of the brain networks. Following is a small sample of methods for overcoming potential instructional barriers found in each of the three networks: Recognition, Strategic, and Affective.

### *Recognition Network: Provide Alternative Representations of Content*

<i>Potential Barrier</i>	<i>Teaching Strategy</i>	<i>High Tech Solutions</i>	<i>Low Tech Solutions</i>
<i>Presentations and materials</i> fail to provide sufficient examples for critical concepts.	Provide multiple examples and alternative formats for presenting information and concepts	PowerPoint, search digital books, graphic organizer software, video clips	Picture representation, use sound bites, role play, graphic organizer on paper, board or card games
May be difficult for student to extract key points from <i>lecture</i>	Highlight critical features	Inspiration Software, context mapping, digitized text with highlighting, semantic tagging that pulls out main ideas	Highlight outline, use index cards or Post-Its, give accompanying materials ahead of time including graphic organizer and notes, color code, concept map
<i>Print materials</i> may be difficult to see, decode, or comprehend	Provide multiple media and formats	Digitized text provides large font size, change type of font, text-to-speech software, refreshable Braille	Audio, read out loud, cooperative learning, diagrams, magnifier, ruler with highlighted sections, reading buddies, print materials
<i>Context presentation and activities</i> assume same basic background knowledge for all students	Support students with background contextual information	Electronic books with text-to-speech, substitute names in text to simplify for students, use of homophone, dictionary, and thesaurus tools on software, use of semantic tagging to explain concepts	Provide different scenarios that involve current student background knowledge and relate, group discussion, parent involvement, read trade books to improve background knowledge

*Strategic Network: Provide Multiple Options for Expression & Control*

<i>Potential Barrier</i>	<i>Teaching Strategy</i>	<i>High Tech Solutions</i>	<i>Low Tech Solutions</i>
Student is expected to understand and be able to use the presented concept through reading and lecture	Provide flexible materials and instruction	Text-to-speech software so student can see and hear information at own speed – offers opportunity for repeating	Peer tutoring, buddy reading, scaffolding learning, rubric, role play, recreate in own words, draw a picture, discuss, cooperative learning
One end-of-unit test and one project are used as only means of displaying knowledge for students	Provide ongoing, relevant feedback	Inspiration software, software that provides immediate feedback and corrective information, computer-based assessment with same supports as student has during learning, create a visual representation of concepts using graphics organizer or other software	Poster story, selecting examples, provide frequent oral and written feedback, multiple project performance opportunities, break unit test into sections

*Affective Network: Provide Options that Promote Engagement, Interest, and Motivation*

<i>Potential Barrier</i>	<i>Teaching Strategy</i>	<i>High Tech Solutions</i>	<i>Low Tech Solutions</i>
Book content and teacher selected tools are expected to be of interest to all	Offer choices of content and tools	Digital books, internet, web-based resources	Family involvement, student choice of materials, adjust lesson to interests
Lesson activities have limited range of difficulty, making learning too easy or too difficult	Offer adjustable levels of challenge	Digitized text that highlights main idea or has links to deeper information	Peer partnering, enrichment activities
Feedback and rewards are selected in advance and are identical for all students	Offer choices of rewards	Use of computer is rewarding for many students. Software can provide frequent feedback and positive reinforcement without seeming patronizing	Student selected rewards, teacher positive reinforcement

## Conclusion

Burgstahler at the University of Washington's Do-It Project, concisely describes the UDL principles in the following manner:

1. **Inclusiveness:** Create a classroom environment that respects and values diversity.
2. **Physical access:** Assure that classrooms, labs, and field work are accessible to individuals with a wide range of physical abilities.
3. **Delivery methods:** Provide alternate delivery methods, including lecture, discussion, hands-on activities, internet-based interaction, other technologies, and field work.
4. **Information access:** Use captioned videotapes. Make printed materials available in electronic format. Provide text descriptions of graphics presented. Provide printed materials early to allow students to prepare. Create printed and web-based materials in intuitive and consistent formats.
5. **Interaction:** Encourage different ways for students to interact with each other and with the teacher.
6. **Feedback:** Provide effective prompting during an activity and feedback during and following an assignment.
7. **Demonstration of knowledge:** Provide multiple ways for students to demonstrate knowledge. For example, besides traditional tests and papers, consider group work, demonstration, portfolios, and presentations as options for demonstrating knowledge. (Burgstahler, 2001)

UDL is a means to achieve access to learning for all students. It is an instructional design umbrella that covers computer technology, differentiated instruction, and accommodations and adaptations. The curriculum needs to be flexible enough to enable cognitive, sensory, and physical accommodations that the teacher evokes rather than builds from the ground up. With the technology available to us today, there is no reason for teachers to have to reinvent the wheel, one trip at a time.

Individual student needs should drive the form of their specially designed instruction; some people need learning packaged differently. All students can make the same connections, if content can be represented differently, the environment can allow for different forms of engagement, and teachers allow for various forms of expression of student knowledge.

## UDL Resources

### *UDL Literature:*

- The Do-It Project, [www.washington.edu/doit](http://www.washington.edu/doit)
- National Center for Accessing the General Curriculum, [www.cast.org/ncac](http://www.cast.org/ncac).
- "Teaching Every Student" book, community, activities, presentations, UDL Systemic Change Planner [www.cast.org/teachingeverystudent/](http://www.cast.org/teachingeverystudent/)
- The Learning Brain article, [www.cast.org/udl/index.cfm?i=10](http://www.cast.org/udl/index.cfm?i=10)
- Information on National File Format, [www.cast.org/ncac/index.cfm?i=3140](http://www.cast.org/ncac/index.cfm?i=3140)
- CAST's Thinking Reader, [www.cast.org/udl/index.cfm?i=2243](http://www.cast.org/udl/index.cfm?i=2243)
- The Thinking Reader Project, [www.cast.org/udl/index.cfm?i=2660](http://www.cast.org/udl/index.cfm?i=2660)
- Thinking Readers Part II, [www.cast.org/udl/index.cfm?i=2995](http://www.cast.org/udl/index.cfm?i=2995)
- A Curriculum Every Student Can Use, [www.cec.sped.org/udesign.htm](http://www.cec.sped.org/udesign.htm)
- Louisiana Center for Educational Technology – UDL, [www.doe.state.la.us/lde/lcet/399.html](http://www.doe.state.la.us/lde/lcet/399.html)
- National Educational Technology Plan, <http://www.nationaletechplan.org/default.asp>
- The Access Center for Improving Outcomes for All Students K-8, <http://www.k8accesscenter.org/default.asp>
- Universal Design to Support Access to the General Education Curriculum, [www.k8accesscenter.org/training\\_resources/UniversalDesign.asp](http://www.k8accesscenter.org/training_resources/UniversalDesign.asp)
- North Carolina State University College of Design, [www.design.ncsu.edu](http://www.design.ncsu.edu)

### *UDL Tools:*

- National Center for Accessing the General Curriculum, [www.cast.org/ncac](http://www.cast.org/ncac)
- eReader information sheet, [www.cast.org/udl/index.cfm?i=211](http://www.cast.org/udl/index.cfm?i=211)
- ReadPlease 2002, <http://readplease.phpwebhosting.com/rp2002download.phtml>
- TextAloudMP3 information sheet, [www.pcworld.com/downloads/file\\_description.asp?fid-7409](http://www.pcworld.com/downloads/file_description.asp?fid-7409)
- TextHelp, <http://www.texthelp.com/default.asp>
- All-Tech, [www.alltech-tsi.org](http://www.alltech-tsi.org)
- Graphics organizers, [www.cast.org/ncac/index.cfm?i=3015](http://www.cast.org/ncac/index.cfm?i=3015)
- Samples of graphics organizers, [www.sdcoe.k12.ca.us/score/actbank/toganiz.htm](http://www.sdcoe.k12.ca.us/score/actbank/toganiz.htm)
- Inspiration Tutorial, [www.inspiration.com/download/pdf/insp\\_quick\\_start.pdf](http://www.inspiration.com/download/pdf/insp_quick_start.pdf) and [www.inspiration.com/tutorials/index.cfm?fuseaction=insp](http://www.inspiration.com/tutorials/index.cfm?fuseaction=insp)
- eText Spider [www.cast.org/udl/index.cfm?i=1300](http://www.cast.org/udl/index.cfm?i=1300)
- Online resources, [www.cast.org/udl/index.cfm?i=211&option=OnlineResources](http://www.cast.org/udl/index.cfm?i=211&option=OnlineResources)
- UDL Toolkit, [http://www.cast.org/teachingeverystudent/toolkits/tk\\_introduction.cfm?tk\\_id=61](http://www.cast.org/teachingeverystudent/toolkits/tk_introduction.cfm?tk_id=61)

### *Universally Designed Assessment:*

- National Center on Educational Outcomes, [http://education.umn.edu/NCEO/TopicAreas/UnivDesign/UnivDesign\\_topic.htm](http://education.umn.edu/NCEO/TopicAreas/UnivDesign/UnivDesign_topic.htm)
- North Carolina Dept. of Public Instruction, Testing Section, <http://www.ncpublicschools.org/accountability/testing/briefs/>

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