Universal Design for Learning: Speech-Language Pathologists and Their Teams Making the Common Core Curriculum Accessible

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ABSTRACT

The Universal Design for Learning (UDL) framework was named in the supporting documents for the Common Core State Standards (CCSS) as a means of helping all students, especially those with disabilities, to meet and exceed the rigorous expectations. This article will describe the principles of UDL, show how educational teams use the framework to design instruction to teach the CCSS with examples from science and English language arts, and finally explore how the implementation of UDL provides an opportunity for speech-language pathologists to play a critical role in school improvement and instructional design and support.

KEYWORDS: Universal Design for Learning, speech-language, curriculum-relevant intervention, Common Core State Standards, lesson planning

Learning Outcomes: As a result of this activity, the reader will be able to: (1) list the principles of Universal Design for Learning (UDL); (2) plan lessons using UDL principles to teach Common Core State Standards; and (3) describe three ways a speech-language pathologist can participate in a UDL initiative.

Imagine school teams leveraging technology to design curriculum that meets all learner needs. Imagine a more challenging curriculum that captures students’ attention and improves achievement for all students. Imagine helping students learn skills such as critical thinking,


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ISSN 0734-0478.
collaboration, communication, and creativity, while increasing academic rigor. Universal Design for Learning (UDL) is an effective way to help all students meet and exceed the rigorous Common Core State Standards (CCSS). This article will describe the UDL framework, show how educational teams use the framework to plan lessons with examples from science and English language arts (ELA), and explore how the implementation of UDL provides an opportunity for speech-language pathologists (SLPs) to play a critical role in school improvement and instructional design and support.

The implementation of UDL provides a structured opportunity for SLPs to serve multiple roles in schools as outlined by American Speech-Language-Hearing Association (ASHA). SLPs have important roles not only related to meeting student needs as outlined in Individualized Education Programs (IEPs), but also related to helping develop systems to provide better access to the curriculum for all students. Working toward these multiple objectives often has a reciprocal effect. Efforts to increase the curriculum relevance for students working with SLPs will improve education for students who are at risk or struggling. SLPs are also increasingly involved in prevention efforts such as Response to Intervention or UDL. They increase the relevance and quality of service to students through their involvement with the curriculum, collaboration with teaching teams, and ability to serve the student in context.

In Michigan’s Macomb County, just north of Detroit, the Macomb Intermediate School District is engaged in an ongoing professional development effort to provide local educators with the tools and skills necessary to integrate UDL principles and strategies into everyday classroom instruction. For the past 5 years, the project titled Engage, Expand and Encompass through Technology (E3T), has been fostering middle and high school teams of educators to minimize learning barriers and create UDL curriculum that increases the opportunity for all students to learn. These teams focus on designing instruction that supports and motivates all students, ensuring that every student has an opportunity to make progress in the general curriculum. In the E3T project, training is delivered in a hybrid model. Teams learn via a combination of ongoing professional development workshops, team-centered school-based support, and online learning modules. These modules and additional teacher resources can be found on our Web site, E3T.org.

E3T teams learn to create a flexible curriculum designed to meet the needs of a wide range of students including students who are gifted, struggling with content, disengaged, or learning English as a second language—in short, all of the students in all classrooms.

**WHY USE UDL?**

Expectations for students have never been higher, and schools and teachers are held to higher levels of accountability than ever before. No Child Left Behind (NCLB) and Individuals with Disabilities Education Act (IDEA 2004) both address these rising standards. In the reauthorization of IDEA, Congress stated clearly that special education students must be considered general education students first. In the current draft of the reauthorized Elementary and Secondary Education Act, all students, including those receiving special education or related services or accommodations, are entitled to be given the opportunity to become proficient on grade-level content standards.

These policy changes are setting a new course for education in the United States. No longer is it acceptable to track students into predetermined learning paths. Educators must ensure that every student, despite different learning interests, abilities, and needs, has access to the same rigorous core content. This shift in education policy and philosophy, though long overdue, has added additional stress to an already strained system, at a time when education funding and resources are growing scarcer.

The authors of the CCSS believe that the UDL framework will help teachers to successfully deliver the general curriculum to students with disabilities. The supplemental appendix to the CCSS titled “Application to Students with Disabilities” repeatedly emphasizes that the CCSS are intended to increase the rigor of
the curriculum for all students, including students with disabilities. All students must be given the opportunity to participate in and be challenged to excel in the high standards. The document goes on to say that scaffolding such as “Instructional supports for learning—based on the principles of Universal Design for Learning” ensures that students with disabilities can participate with success. UDL is defined in the document using the legal definition from the Higher Education Opportunity Act of 2008 quoted below. UDL is the intentional design of instruction that focuses on carefully selecting goals, methods, materials, and assessment.

It is a scientifically valid framework for guiding educational practice that (1) 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 (2) 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.

**UNIVERSAL DESIGN IN ARCHITECTURE**

The concept of universal design began as a solution to the architectural challenge of removing physical barriers. These efforts have sought to create new environments and products that would be, to the greatest extent possible, usable by everyone regardless of their age, ability, or circumstance. One common example is curb cuts that allow wheelchair users to move throughout their neighborhood streets, but are also convenient for others with strollers, in-line skates, or bicycles. Another example of universal design is closed captioning for the hearing impaired. It also benefits viewers at the gym or in other loud places. In addition, products such as thick-gripped kitchen utensils or handles in cars that began as assistive devices have frequently crossed over to become mainstream tools. The universal design movement has helped persons with disabilities to integrate into the mainstream.

**UNIVERSAL DESIGN APPLIED TO LEARNING**

When universal design is applied to learning, learning supports are built into the curriculum for any student to use, reducing potential learning barriers for all students. The “universal” in UDL does not mean one perfect solution for everyone, but rather is inherently flexible, with customizable content, assignments, activities, and assessments. Planning begins with the recognition that each learner is unique. With student diversity in mind, educators design instruction that anticipates the need for a variety of options and supports. From the start, options for interests, perception, learning strengths, language ability, and motivation are built into the lesson. Students then learn to select the options they need, resulting in instruction customized by the individual learner.

**GUIDELINES FOR UDL**

Table 1 shows the UDL guidelines that articulate the UDL framework and provide assistance to educators when planning curricula and identifying barriers and solutions. They began as a project of the National Center on Accessing the General Curriculum, a cooperative agreement between Center for Applied Special Technology and the U.S. Department of Education, Office of Special Education Programs and are now in their second edition. These guidelines and many other resources are available at the Web site of the National Center on Universal Design for Learning, www.udl-center.org. The National Center for Universal Design for Learning connects 40 national stakeholder organizations, of which the ASHA is an active participant.

Other guiding documents are available from the site, such as those in development by the Universal Design for Learning Implementation and Research Network, defining the critical elements of UDL, beliefs about UDL, and the processes for implementation. 

**PRINCIPLES OF UDL**

There are three principles that make up the foundation of UDL. UDL guidelines, beliefs,
and critical elements are organized around these principles.

**Provide Multiple Means of Representation**
Representing information using a variety of supports, instructional tools, methods, and modalities helps ensure that all students have the opportunity to learn from the content presented. For example, consider a lesson that relies solely on reading a textbook and a class lecture. Although this approach is adequate for some students, students for whom English is not their first language or students who have a reading disability may have difficulty extracting meaning. These students might benefit from information paired with descriptive images or videos, or with software that reads the text aloud. When presenting new information in multiple ways, educators can activate students’ background knowledge, highlight the main

<table>
<thead>
<tr>
<th>I. Provide Multiple Means of Representation: For Resourceful, Knowledgeable Learners</th>
<th>II. Provide Multiple Means for Action and Expression: For Strategic Goal-Directed Learners</th>
<th>III. Provide Multiple Means for Engagement: For Purposeful, Motivated Learners</th>
</tr>
</thead>
</table>
| 1. Provide options for perception.  
- Offer ways of customizing the display of information.  
- Offer alternatives for auditory information.  
- Offer alternatives for visual information. | 4. Provide options for physical action.  
- Vary the methods for response and navigation.  
- Optimize access to tools and assistive technologies.  
- Provide options for expression and communication. | 7. Provide options for recruiting interest.  
- Optimize individual choice and autonomy.  
- Optimize relevance, value, and authenticity.  
- Minimize threats and distractions. |
| 2. Provide options for language, mathematical expressions, and symbols.  
- Clarify vocabulary and symbols.  
- Clarify syntax and structure.  
- Support decoding of text and mathematical notation and symbols.  
- Promote understanding across language.  
- Illustrate through multiple media. | 5. Provide options for expression and communication.  
- Use multiple media for communication.  
- Use multiple tools for construction and composition.  
- Build fluencies with graduated labels of support for practice and performance. | 8. Provide options for sustaining effort and persistence.  
- Heighten salience of goals and objectives.  
- Vary demands and resources to optimize challenge.  
- Foster collaboration and community.  
- Increase mastery-oriented feedback. |
| 3. Provide options for comprehension.  
- Activate or supply background knowledge.  
- Highlight patterns, critical features, big ideas, and relationships.  
- Guide information processing, visualization, and manipulation.  
- Maximize transfer and generalization. | 6. Provide options for executive functions.  
- Guide appropriate goal setting.  
- Support planning and strategy development.  
- Facilitate managing information and resources.  
- Promote expectations and beliefs that optimize motivation.  
- Facilitate personal coping skills and strategies.  
- Develop self-assessment and reflection. |

ideas in a lesson, and provide language and vocabulary support as needed.

**Provide Multiple Means of Action and Expression**
Designing instruction that includes multiple options for supporting active learning and a choice of materials or modalities for expressing knowledge helps ensure that all students can effectively apply and share their learning. Students learn best when new, complex tasks are scaffolded. Providing students with a variety of approaches to organize and remember information so they can become strategic in their learning is critical. For example, some students learn to apply information best through checklists, and others are more successful using mnemonics or a template.

Providing a variety of options for learners to share their thinking is another critical component to this pillar of UDL instructional design. Some students may be able to express themselves best in writing, and others perform best creating multimedia presentations, and still others excel at oral presentations.

**Provide Multiple Means of Engagement**
Providing instruction that encourages active participation and exploration and includes options for choice, challenge, relevance, and novelty ensures that all students can engage in the content and maintain their motivation to learn. Every student comes to the learning opportunity with different interests, backgrounds, and preference for things like challenge and novelty. Some students are motivated by tasks that encourage creative thinking, and others prefer tasks that are predictable and routine. Some students are highly engaged by tasks in which they can compete with their peers, yet others become disengaged by competition and prefer tasks that are independent or cooperative.

**CRITICAL ELEMENTS OF UDL**
Instruction aligned to the UDL principles should minimally include clear goals; inclusive, intentional planning; flexible methods and materials; and timely progress monitoring.  

**Clear Goals**
Establishing clear goals and outcomes, aligned to content standards and written in language that is understandable and posted broadly in the classroom, is the first step in designing UDL instruction. Knowing the expectations and outcomes of a lesson helps educators and students stay focused on critical learning objectives and helps SLPs to make connections to language intervention goals.

**Inclusive, Intentional Planning**
Anticipating student diversity and the potential learning needs of every student is the hallmark of UDL. A common misconception often repeated about UDL is that it is “just good teaching.” Although it is good teaching, what makes UDL different from some other learning frameworks is the emphasis on planning ahead, or front-loading the curriculum with assistive supports. Planning ahead for student success, instead of reacting to student failure, means that educators can give thoughtful consideration to embedding the right supports that address student needs while emphatically maintaining instructional rigor.

The more often that teachers and SLPs collaborate to plan and design instruction, the better the instructional plan. Each time a team works through a student case, they can consider which accommodations might need to be adopted as a standard part of future curriculum activities and supports.

**Flexible Methods and Materials**
The third critical element refers to strategies for employing a variety of flexible methods and materials in the instructional process. Well-placed technology can play a significant role in providing flexible materials. Building access to the curriculum through digital media and tools such as Web sites, video clips, and electronic text can be very effective. When content is provided digitally, it becomes flexible, enabling students to select and adjust the information to best meet their learning needs. With digital content, learners can manipulate qualities such as font size, contrast, volume, and text length or activate supports such as text to
speech or online definitions for new vocabulary words. In addition, providing a variety of electronic tools such as note takers, word processors, video recorders, audio recorders, and multimedia authoring software enables students to record and share information with others in a manner that supports their learning needs. Not only do these well-placed technology tools ensure access to information for all students, they also provide a potential gateway for including specific assistive technologies required by more challenged learners.

Although technology can make designing UDL instruction easier and more effective, it is necessary to point out that simply using technology in the classroom should not be confused with UDL implementation. To be considered UDL implementation, technology tools and digital media need to be carefully planned and woven into the curriculum as a strategy to support students as they work toward achieving content goals.

### Timely Progress Monitoring

The final element required for effective UDL instruction is timely progress monitoring. The purpose of progress monitoring is to assess students’ ongoing performance and to evaluate the effectiveness of instruction. Monitoring student performance allows educators to identify specific ideas or concepts that are difficult. With a clear focus on areas in which students struggle, teachers can make better instructional decisions and intentionally deploy strategies or instructional opportunities to ensure improved performance. In addition, providing immediate, meaningful feedback to students encourages them to monitor their own progress and seek out additional learning supports or learning opportunities as needed.

Instructional design of summative assessments is also important. Designing assessments that allow students to select and use their preferred method to express their content knowledge ensures a more accurate snapshot of their learning by eliminating the potential for unnecessary barriers when one or two teacher-imposed modalities are used.

### LESSON PLANNING USING UDL AND THE CCSS

An online planning system called the E3T Lesson Plan Creator was developed for this project at Macomb ISD. Participants in the E3T project create lesson plans that incorporate the critical elements of UDL instruction using an outline adapted from Price and Nelson. The parts of the lesson include:

- **Big ideas:** “Big ideas” are concepts or principles central to the lesson that connect the smaller ideas.
- **Essential questions:** Relevant inquiry questions help students probe for deeper meaning in a subject.
- **Learning objectives:** These are two to four measurable learning targets that reflect the insights students are expected to develop by the end of this lesson.
- **Lesson opening:** Opening activities engage the students, establish a purpose, promote curiosity, and activate students’ prior knowledge.
- **Exploration:** Inquiry-based learning activities provide a low-threat environment where students can apply prior knowledge, explore new concepts, and develop ideas about the essential questions.
- **Checks for understanding:** Formative assessments are used to provide immediate feedback to both the learner and the instructor regarding the students’ levels of understanding of the big ideas, essential questions, and learning objectives.
- **Explanation:** Activities help students expand their emerging understanding of the learning targets and develop a mastery of objectives. Careful consideration is given to selecting delivery methods and materials. Instruction includes a variety of explicit learning strategies to support application of the learning, multiple means of representing information, frequent opportunities for response and practice, and a variety of student-centered learning activities.
- **Check for understanding:** Further formative assessment is used to ensure grasp of the content, including a plan for reteaching material as needed.
Table 2 Universal Design for Learning English Language Arts Example: *Hamlet* Lesson

<table>
<thead>
<tr>
<th>Lesson Elements</th>
<th>Lesson Information and Activities</th>
<th>Common Core State Standards for English Language Arts, Grade Band 11–12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big ideas and essential</td>
<td>Big ideas:</td>
<td>CCR Literacy—Capacities of the literate individual:</td>
</tr>
<tr>
<td>questions</td>
<td>- Every decision is the result of a decision-making process and all decisions have consequences.</td>
<td>- Demonstrate independence as readers, writers, speakers, listeners, and language users.</td>
</tr>
<tr>
<td></td>
<td>- Decisions can be made via</td>
<td>- Build strong content knowledge.</td>
</tr>
<tr>
<td></td>
<td>1. inaction or action;</td>
<td>- Respond to the varying demands of audience, task, purpose, and discipline.</td>
</tr>
<tr>
<td>Lesson opener/engagement</td>
<td>2. influences of others or personal research/experience in decision making.</td>
<td>- Comprehend as well as critique.</td>
</tr>
<tr>
<td>Exploration</td>
<td>Essential questions:</td>
<td>- Value evidence.</td>
</tr>
<tr>
<td></td>
<td>- How do you know if a decision was the right one?</td>
<td>- Use technology and digital media strategically and capably.</td>
</tr>
<tr>
<td></td>
<td>- What steps should one take when making an important decision?</td>
<td>- Understand other perspectives and cultures.</td>
</tr>
<tr>
<td></td>
<td>Watch the videos and complete the Venn diagram that highlights similarities and differences between these short decision making videos:</td>
<td>Speaking and Listening:</td>
</tr>
<tr>
<td></td>
<td>- Full House decision: <a href="http://www.youtube.com/watch?v=0xRpGMeJPs8">http://www.youtube.com/watch?v=0xRpGMeJPs8</a></td>
<td>SL.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</td>
</tr>
<tr>
<td></td>
<td>- Voting for Obama: <a href="http://www.youtube.com/watch?v=c_T0vz6B1A8">http://www.youtube.com/watch?v=c_T0vz6B1A8</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decisions and their consequences (online resource):</td>
<td>Speaking and Listening:</td>
</tr>
<tr>
<td></td>
<td>&quot;Real Choices&quot; Web drama: Explore how choices lead to consequences, <a href="http://www.knowitall.org/keepitreal/">http://www.knowitall.org/keepitreal/</a></td>
<td>SL.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</td>
</tr>
<tr>
<td></td>
<td>Students choose from five vignettes. Each video scenario depicts a teen with a dilemma. Then from multiple options, the viewer selects a characters’ response to the scenario. The video plays out the decision and its impact on the other characters in the scene.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whole group: Use decision-making graphic organizer to map several student decisions.</td>
<td></td>
</tr>
<tr>
<td>Lesson Elements</td>
<td>Lesson Information and Activities</td>
<td>Common Core State Standards for English Language Arts, Grade Band 11–12</td>
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<tr>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Check for understanding</td>
<td>Students use the decision-making graphic organizer to map the decision they made in the video drama, then respond on the blog to the following prompt: What decision-making process did you follow? How did your decision affect the main character and the other characters in the scene? Scaffolds: Writers can use spell-checker, word prediction, speech to text, or can record response and upload as .mp3 files.</td>
<td>SL.11–12.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively. SL.11–12.3. Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.</td>
</tr>
<tr>
<td>Explanation</td>
<td>Whole-group instruction: Video summary of act 1 scene v. Independent reading of selection: Students read act 1 scene v, using one of the scaffolded options offered Whole-group instruction: Teacher model: lift text from scene and project it for class view. Model how to use a variety of graphic organizers and marginalia for examining text structure. Think aloud as you model. Post modeled graphic organizers and think-aloud prompts around the room. Small group: Begin guided practice: Select another section of text from the scene and guide small groups through the thinking and use of graphic organizer. Allow students to select marginalia tools and the graphic organizer that works best for them.</td>
<td>Reading—Literature: RL.11–12.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain. RL.11–12.7. Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text. (Include at least one play by Shakespeare and one play by an American dramatist.) RL.11–12.4. Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)</td>
</tr>
<tr>
<td>Check for understanding</td>
<td>Students use the decision-making graphic organizer to map a personal decision they made recently in their life and relate its outcome and effect on others. Respond on the blog to the following prompt: What decision-making process did you follow? How did your decision affect you and others in your example? Scaffolds: Writers can use spell-checker, word prediction, speech to text, or can record response and upload as .mp3 files.</td>
<td>Speaking and Listening: SL.11–12.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively. SL.11–12.3. Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.</td>
</tr>
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<td>Lesson Elements</td>
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</tr>
<tr>
<td>-----------------------</td>
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</tr>
</tbody>
</table>
| Summative assessment  | Each student will create a presentation describing a personal decision they made recently and compare it to a decision Hamlet made in the play. Students select their choice of medium to use to tell a compelling story. Each presentation must include:  
  • A clear explanation of the life event that required a complex decision.  
  • A description of a Hamlet’s decision, with text citations to support.  
  • A cohesive comparison between Hamlet’s and the students’ decision-making process.  
  • A comparison of the affect of their decisions on others versus Hamlet’s.  
Presentations will be graded on: ability to accurately cite the text, description of the decision-making process, quality of comparison, presentation appeal, presentation creativity. The presentation may take the form of your choice such as a podcast, cartoon, videocast, digital story, song/rap, or a written paper. | SL.11–12.4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.  
SL.11–12.5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.  
Reading—Literature:  
RL.11–12.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain. |
Extended practice: Activities and resources challenge and extend students’ conceptual understanding and provide opportunities to practice learned skills.

Summative assessment: End-of-unit assessments clearly assess the students’ progress toward mastering the big ideas, goals, and objectives. Students choose from various ways to demonstrate knowledge such as creating a video, podcast, PowerPoint presentation, Web site, digital cartoon, a written paper, or other activities that show evidence of learning. Culminating activities should be defined by an explicit, easily understood description of the criteria for quality work, such as a rubric.

### LESSON PLANNING UDL IN ELA

Examples of lessons designed with the UDL framework and aligned to the CCSS are provided for ELA and science. The first example, shown in Table 2, is an ELA lesson on Shakespeare’s *Hamlet* that explores the processes and consequences surrounding important decisions. Each of the E3T lesson plan elements shown in the left column are supported with attention to the three UDL principles of multiple means of representation, expression, and engagement through the instructional activities described in the middle column. The CCSS addressed in each part of the lesson are identified in the right column of the table. To further illustrate how the supports are designed, Table 3 shows the support options for the explanation portion of the activity in more detail. The explanation portion is often that part of the lesson that once consisted of primarily text and lecture. Planning and implementing the provision of options based on UDL principles for this portion of the lesson are often an excellent place for the SLP to collaborate. In the ELA lesson, this is a critical juncture where the CCSS related to understanding complex text is addressed. The planning of this portion (which may be a prevention task if it is done before students are assigned to SLPs) is richer with the collaboration of the deep language expertise of the SLP.

### LESSON-PLANNING UDL IN SCIENCE

#### CCSS Literacy in Science

The science lesson shown in Table 4 follows the same template with three columns.

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**Table 3  Examples of Universal Design for Learning Supports for Hamlet Act 1 Scene v. Scaffolds of Support Offered During Explanation Section**

<table>
<thead>
<tr>
<th>Whole-Group Instruction</th>
<th>Scaffolds of Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video clip scene</td>
<td>Use closed captioning.</td>
</tr>
<tr>
<td>Independent reading of selection</td>
<td>Use traditional text.</td>
</tr>
<tr>
<td></td>
<td>Read scene using translation from No Fear Shakespeare.</td>
</tr>
<tr>
<td></td>
<td>Read scene synopsis: SparkNotes.</td>
</tr>
<tr>
<td></td>
<td>Listen to the scene using text-to-speech software on any digital source.</td>
</tr>
<tr>
<td></td>
<td>Listen to audio clip of scene (Lit2Go).</td>
</tr>
<tr>
<td>Whole-group instruction:</td>
<td>Use highlighter tape, sticky notes, page flags to add marginalia to text.</td>
</tr>
<tr>
<td>teacher model: how to use graphic organizer and marginalia for examining text structure</td>
<td>Use electronic marginalia with Adobe, MS Word, or Diigo.</td>
</tr>
<tr>
<td>Small-group instruction:</td>
<td>Supply multiple organizers with range of complexity, structure.</td>
</tr>
<tr>
<td>guided practice: working as a group, select another section and guide thinking through use of graphic organizer.</td>
<td>Use traditional text.</td>
</tr>
<tr>
<td></td>
<td>Read scene using translation from No Fear Shakespeare.</td>
</tr>
<tr>
<td></td>
<td>Read scene synopsis: SparkNotes.</td>
</tr>
<tr>
<td></td>
<td>Use text-to-speech software on any sources.</td>
</tr>
<tr>
<td></td>
<td>Listen to audio clip of scene (Lit2Go).</td>
</tr>
<tr>
<td></td>
<td>Use highlighter tape, sticky notes, page flags to add marginalia to text.</td>
</tr>
<tr>
<td></td>
<td>Electronic marginalia with Adobe, MS Word, or Diigo.</td>
</tr>
<tr>
<td></td>
<td>Supply multiple organizers with range of complexity, structure.</td>
</tr>
<tr>
<td>Lesson Elements</td>
<td>Lesson Information and Activities</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Big ideas and essential     | **Big ideas:**  
  - All matter is made up of three universal particles. (Higher understanding advances this concept to be six fundamental particles.)  
  - If the building blocks of the universe are all the same, then it is the organization of these universal particles that determines the outcome.  
  **Essential questions:**  
  - What is matter?  
  - If positive protons repel each other, why does the nucleus stay together?  
  - How many different ways are there to organize subatomic particles? | CCR Literacy—Capacities of the literate individual (refer to ELA example for details).  
  NGSS core concepts:  
  - PS 1: matter and its interactions. NGSS scientific and engineering practices.  
  - Asking questions (for science) and defining problems (for engineering).  
  - Developing and using models.  
  - Constructing explanations (for science) and designing solutions (for engineering).  
  - Engaging in argument from evidence.  
  - Obtaining, evaluating, and communicating information.  
  NGSS Crosscutting Concepts  
  - Patterns.  
  - Systems and system models.  
  - Structure and function.  
  Science standards (Michigan Department of Education):  
  - Identify a pure substance (element or compound) based on unique chemical and physical properties.  
  - Identify elements with similar chemical and physical properties using the periodic table. |
| questions                   | Coin exploration activity:  
  - Students explore various U.S. and Canadian coins for conductivity and magnetism to begin developing the idea that similar objects with different properties must be made of different substances.  
  - Guided questioning should follow, looking for student thinking about the similarities and differences of the coins content.  
  Tom Lehrer elements song (online resource):  
  - Engaging song is used to introduce the concepts of elements and the idea that there are a limited number of substances that serve as building blocks for all matter.  
  - What is the song about? What makes each of the items different? Are they similar in any way? |
Table 4 (Continued)

<table>
<thead>
<tr>
<th>Lesson Elements</th>
<th>Lesson Information and Activities</th>
<th>CCSS for ELA/NGSS Conceptual Framework</th>
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<tbody>
<tr>
<td>Exploration</td>
<td>Student exploration of periodic table of the elements (online resource):</td>
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<td></td>
<td>- Students explore various online periodic tables and establish a list of questions about various aspects of the tables.</td>
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<td></td>
<td>- Each of the online tables offers a different lens for exploring different aspects of the table.</td>
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<td></td>
<td>- Teacher role at this point is support with additional guided questions to keep students exploring. Students will get more answers during the explanation time.</td>
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<td></td>
<td>- Students can access the instruction link for additional help if needed.</td>
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<td></td>
<td>Sticky note atom activity:</td>
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<td>- Students begin to build large poster-sized atoms with colored sticky notes.</td>
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<td>- First atom is built together to establish rules for atom building (protons and neutrons in center, only certain number of electrons in various levels, etc.).</td>
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<td></td>
<td>- Each group follows the established procedures to build two or more elements. Students then place elements on the wall in the appropriate location to create a wall-sized periodic table.</td>
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<td>- Early finishers can select from the challenge pile for more difficult atoms, ions, isotopes, etc.</td>
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<tr>
<td>Check for</td>
<td>As students build the wall-sized periodic table, assess formatively their ability to make introductory connections between number of protons in an atom and its placement on the periodic table. They should also begin to notice various vertical trends in how the electrons are arranged. Mastery is not required at this time; however, if they do not seem to be identifying patterns you may need to return to the online periodic tables and provided additional guided exploration.</td>
<td></td>
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<tr>
<td>understanding</td>
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</table>

CCSS—Key Ideas and Details:
- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CCSS—Craft and Structure:
- Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to appropriate grades texts and topics.

Science standards (Michigan Department of Education):
- Identify elements with similar chemical and physical properties using the periodic table.
- Identify the location, relative mass, and charge for electrons, protons, and neutrons.
- Describe the atom as mostly empty space with an extremely small, dense nucleus consisting of the protons and neutrons and an electron cloud surrounding the nucleus.
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| **Explanation** | Students are now ready to return as a whole group to the periodic table resources and establish the direct links between placement on the table and elemental structure.  
  - How are all elements similar?  
  - What makes them different?  
  - What patterns and trends appear on the table?  
| **Structure of the atom (online reading and interactive resources):** | Give students time to engage in the online sites listed to continue developing student understanding of the structure of the atom.  
  - Sites are leveled by difficulty and students can choose which level of understanding is appropriate. However, they must do at least one of the interactive sites with an asterisk.  
  - Allow time for students to explore various sites and attempt to cross over to higher levels of information. | CCSS—Key Ideas and Details:  
  - Cite specific textual evidence to support analysis of science and technical texts.  
CCSS—Integration of Knowledge and Ideas:  
  - Integrate technical information expressed in words in a text with a version of that information expressed visually.  
CCSS—Range of Reading and Level of Text Complexity:  
  - Read and comprehend science/technical texts.  
CCSS—Craft and Structure:  
  - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.  
  - Analyze the structure an author uses to organize text.  
Science Standards (Michigan Department of Education):  
  - Identify the location, relative mass, and charge for electrons, protons, and neutrons.  
  - Describe the atom as mostly empty space with an extremely small, dense nucleus consisting of protons, neutrons and an electron cloud surrounding the nucleus.  
  - Recognize that protons repel each other and that a strong force needs to be present to keep the nucleus intact.  
  - List the number of protons, neutrons, and electrons for any given ion or isotope.  
  - Recognize that an element always contains the same number of protons. |
| **Check for understanding** | Scaffold questions with a classroom response system (or student whiteboards) to check for understanding before continuing to extended practice and summative assessment.  
  - If most students have mastered the key concepts, move on and provide options for the few struggling students to receive individualized support. |  

If a significant number of students are still struggling, introduce the human atom activity to the whole group or at least those that will benefit from additional support.

Human atom activity (for whole or small groups depending above results):
- Create various atoms using students and chairs to represent subatomic particles. Girls as protons, boys as electrons and chairs as neutrons. This model is built on opposites (boy/girl, +/− charge).
- Be sure that students address spacing, location, placement, charge of overall atom.
- Discuss strengths and weaknesses of this model.

Extended practice
For students who would benefit from additional opportunities to interact with the content, you can suggest the following resources that can be accessed from home: Supports for struggling students:

Extension for students with a stronger understanding:
- Online simulation that explores Rutherford’s groundbreaking gold scattering research (http://phet.colorado.edu/en/simulation/rutherford-scattering).

Summative assessment
For the culminating assessment each student will create a model of one element from the periodic table. This model can be created in a variety of ways and the selection of medium will be left up to each student. Each model must include:
- An explanation of the model and the history and characteristics of the element must accompany the final product.
- An explanation of the model that includes the parts and

CSS for ELA/NGSS Conceptual Framework

Lesson Information and Activities

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<td>Human atom activity (for whole or small groups depending above results):</td>
<td>CCSS—Integration of Knowledge and Ideas:</td>
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<tr>
<td>Extended practice</td>
<td>Distinguish among facts, reasoned judgment, based on research findings and speculation in a text.</td>
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<tr>
<td>Summative assessment</td>
<td>CCSS—Writing in Science: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</td>
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<td>definitions of an atom with proper placement and labeling of the protons, neutrons, and electrons.</td>
<td>• Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.</td>
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<td>• Examples of how and where this element appears in nature or the real world.</td>
<td>• Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.</td>
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<td></td>
<td>• The history of the element’s discovery.</td>
<td>• Use precise language and domain-specific vocabulary to inform about or explain the topic.</td>
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<td></td>
<td>• Characteristics/physical properties.</td>
<td>• Establish and maintain a formal style and objective tone.</td>
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<td>• A brief explanation of why they chose this element and how it is relevant to them. (It is suggested that students select an element that relates to an area of their interest. For example, a student interested in NASCAR might explore the role of carbon in racing fuel.)</td>
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<td>The model may be made from the materials of their choosing such as Legos, K’nex, beads in wearable jewelry, digital model, or clay/claymation.</td>
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<td></td>
<td>The explanation may take the form of your choice such as a podcast, videocast, digital story, song/rap, or a written paper.</td>
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CCSS, Common Core State Standards; ELA, English language arts; NGSS, Next Generation Science Standards.
representing the lesson component, instructional activities, and standards taught. The standards for science differ in two ways. A major change with the CCSS is the addition of disciplinary literacy standards. The adoption of literacy standards related to science is so new that, in many places, schools are still in the process of deciding how there can be joint ownership of reading and writing goals related to science. In Table 4, the right column includes the CCSS for ELA and Literacy in Science as they are taught throughout the lesson.

**Next Generation Science Standards**
The CCSS do not have a portion related to science content beyond literacy. Instead, there is a national movement toward identifying and adopting a core set of national standards in science, referred to as the Next Generation Science Standards (NGSS). These standards are still in the draft and review process at the time of this publication and may be formally adopted in late 2012. Thus far, only the broad areas are available. To show alignment to science expectations, we have identified the elements of the NGSS Conceptual Framework that have already been adopted (broad areas). In addition, we have identified more specific science concepts using the Michigan Department of Education State Standards. These are specific areas of core science content that are not yet available in the NGSS document. These content expectations should be easily translated to the NGSS when the document becomes available.

This science example was selected because it explores an area of science difficult for many students and is a lesson that benefits significantly from the incorporation of technology and “multiple means” structures of UDL. The lesson explores the model of the atom using a combination of online simulations, songs, video animations, kinesthetic modeling, and traditional and digital text.

The resources that are used in the lesson are listed. Many more Web resources are listed on the E3T project Web site, E3T.org.

**LANGUAGE SKILLS SUPPORTED IN UDL**
The science and ELA lessons above provide a wealth of opportunities for collaboration among SLPs and the teaching team. The language expertise of SLPs is also invaluable to the team’s UDL implementation. A quick perusal of the UDL guidelines shown in Table 1 reveals many areas related to language.

**Vocabulary, Syntax, Decoding (Pillar I. Multiple Means of Representation: Options for Language)**
SLPs help teams to build in supports that will clarify, support, and extend learning related to the vocabulary, syntax of materials, as well as the decoding of the text. In the science lesson (Table 4), we model how an SLP can help a teacher implement three tiers of vocabulary instruction15 with examples of how the SLP and teacher introduce it, post ongoing lists of tier 2 words, and support tier 3 learning. Our teams take an online learning module about strategic vocabulary instruction with vocabulary instructional techniques demonstrated in videos. The module can be viewed at E3T.org. Having this similar learning experience is one way we help the SLP and team begin to collaborate around these areas.

**Comprehension (Pillar I. Multiple Means of Representation: Options for Comprehension)**
Examples in Table 3 show the UDL options for the explanation portions of the *Hamlet* lesson. Graphic organizers along with text lifting are used to assist students in understanding the concepts from the text, in this case the variables in decision making. These supports help students access more complex text as required by the standards with their peers and teacher. When students have these experiences that enable them to comprehend text of more difficulty within their classroom curriculum, they are more likely to generalize it to other classroom tasks as opposed to when they are provided in pullout sessions with the SLP. When the class has not used the strategy, the teacher is not referencing the technique and the
student may not see it as relevant and may not apply it beyond the session. Similarly, strategies and supports to facilitate expressive language in pillar II, multiple means of action and expression for options for construction and composition, are an effective form of collaboration during writing lessons.

Executive Functions and Self-Regulation (Pillar II. Multiple Means of Action and Expression, Options for Executive Functioning, and Pillar III. Multiple Means of Engagement, Options for Self-Regulation)

The UDL framework includes planning for the development of students' executive functioning skills in both the second and third pillar. The team includes options for executive functioning such as guiding goal setting, supporting the student in strategy development and application, and facilitating managing information. In pillar III, options are included for self-regulation, which is another important aspect of executive functioning. SLPs are well versed in advocating and intervening for executive functioning and self-regulation so this makes a particularly effective place to begin collaborative efforts. Westby describes a comprehension model for SLPs to use in addressing executive functioning in language intervention. One way to further detail an SLP's involvement is to combine Westby's intervention model with the UDL framework. Four areas of executive functioning—nonverbal working memory, verbal working memory or the internalization of self-directed speech, emotional control, and problem solving—are considered. These are all needed to work together not only for tasks like long-term project completion but for reading comprehension. When reading, students must protect their concentration, identify during reading when they do not understand, actually interrupt themselves, and then apply strategies to overcome the identified obstacle. This requires automaticity in these steps, which is learned over the long term. Intermittent teaching of strategies will not change the behavior or success of students with weak executive function skills.

SLPs are well versed in the metacognitive difficulties of students who struggle with learning. SLPs regularly work with these executive functioning compensatory strategies. This provides a prime opportunity for the teacher and SLP team to implement overt strategy instruction. In the E3T project, the teams discuss the need for explicit and overt instruction, modeling, and guidance in application of strategies. The teams read about how strategy instruction is meant to provide step-by-step instruction for how good students complete learning tasks. When teachers simply mention a strategy or show it once while moving through content, the high-performing students may pick it up, but it is unlikely that the students who need these strategies will be able to use them without more explicit instruction. View the E3T.org Strategic Learning module at E3t.org.

SLPs PARTICIPATING IN UDL

In many places UDL initiatives are still quite new. SLPs can seize this as an opportunity to advance speech and language services by improving relevancy of services to the curriculum and by helping others to understand the roles that SLPs play in schools today. In addition to language expertise, SLPs often have experience with assistive technology, yet another valuable skill for the implementation of UDL.

Front-Loading the Curriculum

Curriculum-relevant language intervention is a natural fit with UDL. Front-loading the accommodations by planning supports during instructional design is a paradigm shift for most educators, but is not new to the field of speech-language pathology. Almost 20 years ago, Prelock, Miller, and Reed published a guide for SLPs and teachers to analyze upcoming curriculum units and plan scaffolding for different learners in the classroom. The addition of the UDL framework compliments this process and adds the benefits of technology. In the original guide, the SLP and the teacher thought through a lesson and identified learning targets for all students including the higher achievers, the at-risk students, and those with IEPs. Next they identified vocabulary and concepts that might be challenging for each of these groups and discussed instructional methods to opti-
mize success for all learners. The UDL framework helps educators to first ensure they are building in all of the right kinds of supports across the three pillars (see Table 1) and then to capitalize on the latest technology to put these supports in place efficiently.

**Gaining Accepting in Current Roles**

SLPs who have had limited success explaining their potential roles and changing practice within a traditional system have used the UDL project as an opportunity to demonstrate the power of curriculum-relevant services to schools. SLPs report increased involvement in many activities of the school after implementing this initiative. They received increased requests for consultation and participated on more committees. Teachers requested in-classroom services for their students and readily collaborated on both the forming and the implementation of language intervention goals. SLPs report that it has helped the team to write more meaningful goals and more readily connect the positive effects of intervention on the student’s academic success. Their stories represent significant progress, especially for those SLPs who have worked years to help the rest of the school team understand that their services are more than articulation drills.

Some of these changes occurred as SLPs shared expertise that the teaching teams may not have realized they possessed. Knowledge about assistive technologies is needed to plan a UDL curriculum. Many SLPs have experience helping students access content, text, and learning through technology, making the SLPs an asset to the educational team. SLPs help to identify varied ways to present information using multimedia such as images, video, interactive Web sites, leveled text, and devices that make text into speech to allow listening. SLPs are also well versed in the provision of graphic organizers, outlines, speaker notes, and diagrams to highlight the main ideas of a lesson.

**Getting UDL Started or Joining the Initiative**

As with any new initiative, it has taken several years for UDL to gain momentum as a national, state, and local initiative. Sometimes how an initiative begins dictates its initial players. In places where UDL grew out of assistive technology, SLPs may be an integral participant from the beginning. In those cases, transferring the ownership out of special education and assistive technology to general education and curriculum can be an involved process. When the efforts begin in general education with curriculum planning, the teams may not consider including an SLP. This also occurred in our project. In these cases, SLP must advocate for a role on the team.

**CONCLUSION**

The CCSS initiative is meant to offer all students access to a more rigorous academic curriculum and teach the critical collaborative skills required to work and attend school in the 21st century. The UDL framework offers a means of planning curriculum that will provide students access to the new standard by offering flexibility in how information is presented and options for demonstrating knowledge and by engaging students. No longer must educators wait until students struggle to identify barriers and offer supports; using UDL, they can plan ahead to prevent those barriers from occurring. UDL offers a way to accommodate for potential difficulties while raising the expectations. It is an opportunity for all educators to come together in the planning of curriculum, especially for SLPs to effectively use their expertise for the benefit of all students, as well as those with disabilities.

**REFERENCES**

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5. Duncan A. Ask Arne: A Conversation with the Council for Exceptional Children’s (CEC) Members and U.S. Secretary of Education Arne


