

Universal Design for Learning: Recommendations for Teacher Preparation and Professional Development



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Innovation Configuration for Universal Design for Learning

This paper features an innovation configuration (IC) matrix that can guide teacher preparation professionals in the development of appropriate Universal Design for Learning (UDL) content. This matrix appears in the Appendix.

An IC is a tool that identifies and describes the major components of a practice or innovation. With the implementation of any innovation comes a continuum of configurations of implementation from non-use to the ideal. ICs are organized around two dimensions: essential components and degree of implementation (G. E. Hall & Hord, 1987; Roy & Hord, 2004). Essential components of the IC—along with descriptors and examples to guide application of the criteria to course work, standards, and classroom practices—are listed in the rows of the far left column of the matrix. Several levels of implementation are defined in the top row of the matrix. For example, no mention of the essential component is the lowest level of implementation and would receive a score of zero. Increasing levels of implementation receive progressively higher scores.

ICs have been used in the development and implementation of educational innovations for at least 30 years (G. E. Hall & Hord, 2001; G. E. Hall, Loucks, Rutherford, & Newton, 1975; Hord, Rutherford, Huling-Austin, & Hall, 1987; Roy & Hord, 2004). Experts studying educational change in a national research center originally developed these tools, which are used for professional development (PD) in the Concerns-Based Adoption Model (CBAM). The tools have also been used for program evaluation (G. E. Hall & Hord, 2001; Roy & Hord, 2004).

Use of this tool to evaluate course syllabi can help teacher preparation leaders ensure that they emphasize proactive, preventative approaches instead of exclusive reliance on behavior reduction strategies. The IC included in the Appendix of this paper is designed for teacher preparation programs, although it can be modified as an observation tool for PD purposes.

The Collaboration for Effective Educator, Development, Accountability, and Reform (CEEDAR) Center ICs are extensions of the seven ICs originally created by the National Comprehensive Center for Teacher Quality (NCCTQ). NCCTQ professionals wrote the above description.



UDL is an instructional planning and delivery framework intended to increase meaningful access and reduce barriers to learning for students with diverse learning needs, including, but not limited to, students with disabilities, English language learners, and those from diverse cultural and socioeconomic backgrounds. Educational researchers, policymakers, and practitioners have embraced this instructional framework for meeting the needs of an increasingly diverse student population. The purpose of this IC was to provide recommendations for embedding UDL in general and special education pre-service teacher preparation programs and including this content in PD for in-service teachers. It is important to note that when we describe UDL, we are not doing so for a specific population of learners; rather, the point of UDL is to meet the needs of the widest range of learners while acknowledging that there will always be students who require individualization related to areas such as explicit strategy instruction, assistive technology (AT), and modifications to the curriculum. However, when teachers use the UDL framework to proactively plan for student diversity, the need for individualization decreases.

This IC configuration broadly focuses on UDL implementation and practical recommendations rather than on the evidence-based practices (EBPs) because UDL should be considered a framework in which EBPs are embedded. When teachers implement instruction using the UDL framework, they make choices regarding how to deliver EBPs within their instruction in a manner consistent with UDL. Consequently, UDL looks different in different settings and results in different implementation models. However, the UDL principles, guidelines, and checkpoints include a wealth of research available through the National Center on Universal Design for Learning (2012) website (<http://www.udlcenter.org/aboutudl/udlguidelines>). This website provides citations directly tied



to each of the UDL-related principles, guidelines, and checkpoints that we have addressed in this IC.

Basic Principles of Universal Design for Learning

The basis of UDL lies in the conviction that teachers and curriculum developers should identify and ameliorate students' learning barriers through effective instructional planning focused on engagement, flexible use of materials, and meaningfully accessible instruction. UDL is based on foundational research within the neurosciences, developmental psychology, and learning differences (Rose & Gravel, 2010). This research has suggested that to accomplish effective instructional planning, teachers should consider how to integrate three principles into their instruction and assessment practices that are based on three interrelated types of brain networks (i.e., recognition, strategic, and affective networks). Considering teaching and learning through these three brain networks provides a framework for planning instruction for diverse learners (T. E. Hall, Meyer, & Rose, 2012). The UDL framework is based on the following three principles:

- Multiple means of representation to support the ways in which we assign meaning to what we see and recognize (i.e., what we learn): Providing content through multiple channels such as discussion, readings, digital texts, and multimedia presentations.
- Multiple means of action and expression to support strategic ways of learning (i.e., how we learn): Providing opportunities for students to demonstrate their understanding in multiple ways such as through traditional tests or papers as well as through art, multimedia presentations, and digital recordings.



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- Multiple means of engagement to support affective learning (i.e., why we learn):

Considering how to engage students in learning through activities such as collaborative learning, instructional games and simulations, and real and virtual tours.

These three principles expand into more detailed guidelines and checkpoints that teacher educators and PD providers should explicitly introduce, explain, and practice within teacher preparation programs and PD so that new and continuing general and special education teachers can effectively integrate them into their teaching practices (see Figure 1; CAST, 2011).



Universal Design for Learning Guidelines

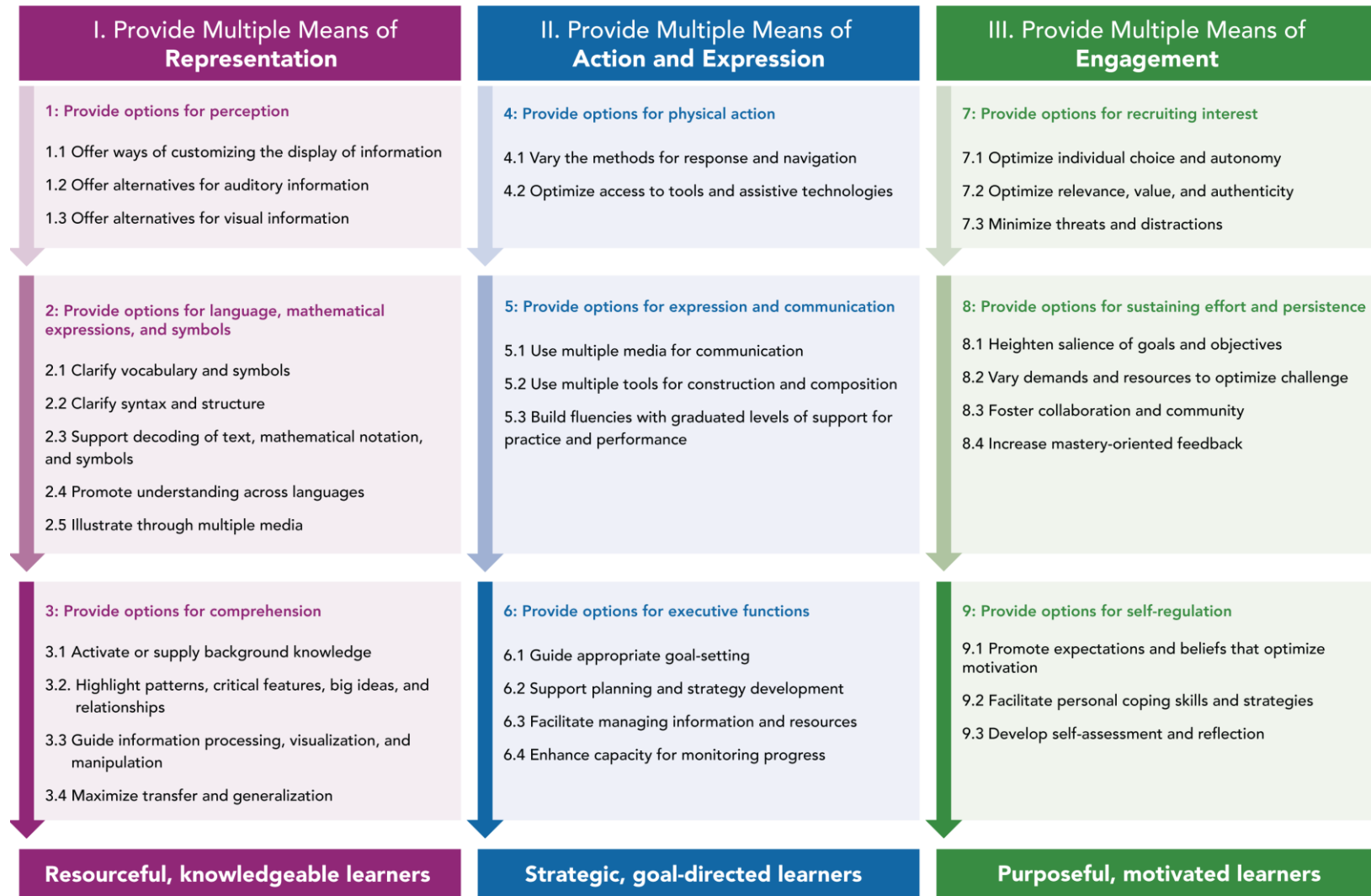


Figure 1. Universal Design for Learning principles and checkpoints.



Although UDL was conceptualized in special education, the focus is on use in general education classrooms (Edyburn, 2013); therefore, it is critical for both general and special education teachers to have strong foundations in UDL. Thus, in this IC, we have provided a road map for integrating the three principles, guidelines, and accompanying checkpoints into teacher preparation programs and PD to equip all teachers to work with diverse learners.

Importance of Planning From a Universal Design for Learning Framework for Instruction and Assessment for Students With Diverse Needs:

Historical, Legal, and Policy Foundations of Universal Design for Learning

It is important to consider the foundational elements of UDL, including policy and legislative components. Ron Mace, an architect and disability rights advocate, coined the term *universal design* in 1988 (Courey, Tappe, Siker, & LePage, 2012). The term subsequently emerged in federal disability policy with the Assistive Technology Act of 1998 (U.S.C. § 3002). The Center for Universal Design (CUD) at North Carolina State University and the Center for Applied Special Technology (CAST) later adapted the principles for education to promote accessibility for all learners (Courey et al., 2012). The term *universal design for learning* appeared in the 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA, 2004); the Common Core State Standards (CCSS, 2012) section entitled “Application to Students with Disabilities”; and The Higher Education Opportunity Act (HEOA, 2008). The HEOA characterized UDL as

a scientifically valid framework for guiding educational practices that: (a) provides flexibility in the ways information is presented, in the ways learners respond or demonstrate knowledge and skills, and in the ways learners are engaged; and (b) reduces barriers in instruction, provides appropriate accommodations, supports and challenges,



and maintains high achievement expectations for all learners including students with disabilities and students who are limited English proficient. (20 U.S.C. § 1022d)

Additionally, the No Child Left Behind Act (NCLB; 2001) and the reauthorization of IDEA in 2004 emphasized increased accountability and access to the general education curriculum for all students. As a result, students with disabilities are increasingly educated in inclusive settings. Based on this changing educational landscape, it is imperative for both general and special education teacher educators to provide instruction related to UDL. The HEOA (2008), in fact, requires states to describe how teacher educators integrate technology into their instruction in a manner consistent with the UDL framework. Last, the *National Education Technology Plan* reaffirmed this importance by stating that implementation of the three UDL principles can lead to improved outcomes for diverse learners (U.S. Department of Education, 2010), pointing to additional evidence that teacher educators, as well as professional developers, should take a proactive role in preparing future teachers to implement UDL in an effective manner.

Components of the Innovation Configuration

This section features the components of the IC matrix as well as recommendations for integrating them within teacher preparation programs and continuing PD within schools. We acknowledge that teacher preparation programs and K-12 instructional settings differ and that any single recommendation may not be appropriate for all settings; therefore, we have provided general descriptions of effective UDL implementation and suggestions that should be adapted to programs and needs.



1.0 General Understanding of How to Use the Universal Design for Learning Framework for Planning Instruction for Diverse Learners

1.1 Understand how the Universal Design for Learning framework can reduce barriers to learning and support high expectations for learning. Experts in the field indicate that a general understanding of the UDL framework is a necessary prerequisite for successful UDL implementation (Edyburn, 2010; Hehir, 2009; Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007). This understanding is especially important as students with disabilities and other struggling learners spend more time within inclusive classrooms due to various policy and best-practice recommendations (Courey et al., 2012).

Teacher educators and professional developers can use the UDL framework to facilitate inclusion by enabling teachers to reduce barriers to learning while maintaining high expectations for all learners. UDL allows teachers to consider learner differences, preferences, and needs at the onset of planning and instruction rather than after lessons have been developed for typical learners and then modified to address individual students' needs (Edyburn, 2010). Traditional planning and curriculum development assumes that learners can access and engage in learning through a single pathway (e.g., reading the textbook, listening to a teacher explain a concept); however, flexibility is not built into this instruction, and lessons must be altered whenever learners struggle. Subsequently, teachers use the UDL framework to structure their lessons to make them accessible and engaging for all learners. If teachers consider the UDL framework in how they address instructional goals, planning, materials, and progress monitoring, they will meet the needs of a wider range of learners.



There are several methods that teacher educators and professional developers can use to integrate UDL into their programs. One way of introducing learners to the UDL framework is to make use of the tools and resources available online. Some examples are as follows:

- The CAST website (<http://cast.org>).
- The National Center on Universal Design for Learning (<http://udlcenter.org>).
- The IRIS Center UDL module—Universal Design for Learning: Creating a Learning Environment that Challenges and Engages All Students (<http://iris.peabody.vanderbilt.edu/module/udl/>).

These web resources can be assigned for homework, can be used in discussions, and can facilitate conversations about whether pre- and in-service teachers have seen or participated in instruction aligned with the UDL framework. Although these tools provide a general introduction to the UDL framework, including the principles, guidelines, and checkpoints, teacher educators and professional developers must develop purposeful experiences in which the framework is used to manipulate content, revise instruction, and address environmental barriers in the general and special education setting.

1.2 Understand how the four curricular pillars of Universal Design for Learning implementation (i.e., goals, instruction, materials, and assessment) are applied in different instructional contexts. The principles of UDL should be considered alongside thoughtful planning related to the four curricular pillars of UDL: (a) instructional goals, (b) instructional delivery methods, (c) instructional materials, and (d) student assessments. Consideration of these four pillars means that instruction is flexible enough to address the needs of diverse learners (Meyer & Rose, 2005; Rose & Meyer, 2002). Classroom instruction is often based on



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- unclear goals for learning beyond those established by national and state standards, which are not typically explicitly shared with students;
 - materials that may or may not be accessible (e.g., written materials presented through textbooks alone); and
 - assessment practices (e.g., paper-and-pencil tests) that assess learners in one way.

In contrast, the UDL framework addresses goals, methods, materials, and assessments in a flexible manner, which makes instructional content both physically and intellectually more accessible (Meo, 2008). Rose and Meyer (2002) provided the following guidelines:

- Instructional goals address learning outcomes for all learners. For example, teachers have clearly defined goals that maintain high expectations for all learners, but the goals are differentiated to be appropriate for a wide range of learners.
- A variety of methods and materials are used in instruction that provides flexibility to address the needs of all learners. For example, teachers make use of multimedia materials, e-text, and other resources that support learning within their instruction.
- The assessments used to evaluate student learning are flexible enough to allow students to demonstrate their learning in an accurate manner not hindered by their disabilities. For example, if a student has difficulty with written expression, a paper-and-pencil assessment requiring written expression will not assess subject understanding.

Although these curricular processes may be taught within teacher preparation programs, they are not often taught in a manner that focuses on flexibility and student diversity.

Consequently, it is important for teacher educators and professional developers to embed these curricular pillars in their instruction of UDL and provide examples across grade levels and



content areas because UDL-based instruction will look different across instructional contexts; this typically occurs because each content area has its own disciplinary mode of thinking and its own text structures and discourse. For example, Curry, Cohen, and Lightbody (2006) explained how the UDL framework was applied to scientific inquiry and described how teachers used tools such as visual content mapping and accessible laboratory and field equipment to ensure that standards-based inquiry learning was planned and implemented in a flexible and accessible manner. In another example, Bouck, Courtad, Heutsche, Okolo, and Englert (2009) described how UDL was integrated into social studies through a web-based curriculum called the Virtual History Museum (VHM) with multiple means of accessing and interacting with historical, geographical, and cultural materials.

Just as Curry and colleagues (2006) and Bouck and colleagues (2009) described how UDL uniquely applies within the context of science inquiry-based and social studies learning, teachers must apply the four curricular pillars of UDL differently in different content areas. Therefore, it is important for teacher educators and professional developers to provide a range of examples of UDL implementation so that teachers can begin to understand general ways of understanding instructional goals, methods, materials, and assessments within a UDL framework and how these are applied in different educational contexts.

1.3 Understand the three principles of Universal Design for Learning framework and how they apply to instructional planning, instruction, and environments that support learning.

Teacher educators and professional developers must be thoughtful and purposeful in their instruction of the three principles of the UDL framework. As previously mentioned, the three principles focus on multiple means of representation, action and expression, and engagement.



Although teachers must be able to identify and define the three principles, teacher educators and professional developers must ensure that this understanding can be applied and generalized to content, planning for instruction, instruction, and the educational environment in which growth and development are expected. While considering the general nature of the three principles, one would expect that these conceptual ideas would be taught in teacher preparation programs (Smith, Robb, West, & Tyler, 2010). However, knowing the definition is one thing; recognizing how it applies to instruction, understanding the steps for implementation, and appreciating why and when to apply the framework requires a deeper understanding. Therefore, teacher educators and professional developers must embed these principles into their instruction, required experiences, activities, and assignments across teacher education course work and PD experiences. By expecting pre- and in-service teachers to consider what these principles mean to content construction and classroom instruction, understanding and implementation of UDL will be enhanced. For example, the three principles can be embedded within content development dependent on pre- and in-service teachers' areas of expertise (e.g., reading instruction, mathematics, behavior, science). Preparation for the elementary, middle, or secondary instructional environment could then be used via the UDL principles to identify potential barriers for struggling learners and those with disabilities. Suggested solutions could also be delivered using these same principles.

To contextualize this information, consider a fourth-grade science classroom. Although the content will differ, it is likely that the foundational knowledge will begin with required reading. Expression of student understanding often includes written science reports. Finally, teacher-directed presentations and experiments within a traditional desk-and-chair environment will be featured.



Nelson (2013) explained how the UDL principles are applied to the planning, content identification, and instructional process so that teachers can identify barriers and then use tools to ensure that instruction is flexible and accessible. Consider the potential challenges in science instruction through the following three principles:

- **Representation:** Foundational reading requires skills in reading for vocabulary, reading fluency, and reading comprehension. Students often struggle with print in identifying critical information and the main idea and structuring the foundational knowledge for subsequent learning. An initial barrier is the printed text and the expectation of a specific reading ability. As a result, subsequent instruction will be negatively affected (Edyburn, 2010).
- **Demonstration:** Science reports present challenges in accessibility and flexibility regarding students' abilities to express understanding. Writing (e.g., mechanics, grammar, organization) can quickly become a barrier.
- **Engagement:** Lectures and structured group experiments often present barriers in promoting student engagement, self-discovery, and empowering students in the learning process.

It is important that pre- and in-service teachers identify barriers associated with content, planning for and delivery of instruction, and the environmental constraints of the classroom. The UDL principles foster the identification of these barriers as well as the purposeful planning for accessible and flexible content and instruction. Likewise, embedding the three principles into content planning and instruction affords teachers an understanding of the application of the UDL framework. Consider the application of these principals in a science classroom:



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- **Representation:** A variety of materials and modes of information develop foundational knowledge. Visual scaffolds, audio, embedded supports, video, illustrations, animations, interactive webs, or similar components contextualize the content for the learner.
 - **Action and Expression:** Opportunities such as illustrations, storyboards, presentations, multimedia, and similar elements demonstrate understanding in an appropriate manner.
 - **Engagement:** Methods to promote engagement and interaction integrate with the learning experience and the instruction process. Interactive games and active learning allow for learner self-determination and activities that enable students to develop social capital.

A mature understanding of the UDL principles enables teachers to appreciate the complexity of the UDL framework while comprehending the complexity and significant barriers associated with typical content, instruction, and the environmental constraints of the K-12 classroom. Standards-based content often assumes that there is a typical student who is the primary audience for the content and subsequent instruction. Furthermore, the primary pathway for learning and assessment is often the foundation for most instructional planning. By embedding the UDL principles into teacher education course work and ongoing PD, the fallacy of the single pathway, the barriers that content and instruction often present to struggling learners and those with disabilities, and the critical elements of the derived solutions can be thoroughly understood by teachers.



1.4 Understand how the nine Universal Design for Learning guidelines and accompanying checkpoints can be used to create instructional environments that support learning. The next step in using the UDL framework to create instructional environments is to understand the UDL guidelines. These guidelines further articulate the UDL framework and offer a path or strategy to reduce barriers and optimize levels of challenges and supports from the beginning (Rose & Meyer, 2002). Teacher educators must infuse the UDL guidelines, the organization of the guidelines, and the connected checkpoints into teacher preparation experiences. As Figure 1 illustrates, the guidelines offer depth to the three principles and a road map to reduce barriers and strategically plan lessons and units of study or curricula for all learners. Each of these guidelines further defines the three principles of UDL, and the corresponding checkpoints clarify and illustrate the guideline and the respective principle. Using these guidelines, teachers can quickly identify barriers common to curricula (i.e., goals, methods, materials, and assessments). Aligning the UDL principles and guidelines to the instructional content (e.g., reading, science, mathematics) provides teachers with a framework to determine which content-specific standard is required by all students, which parts are applicable to most students, and which areas are relevant for enrichment for some students. If teachers understand and appreciate what all students must know about to a curriculum standard (e.g., CCSS), then they can consider the UDL framework and its application to this content.

It is important to note that if teachers are not able to determine what is primary or critical for all learners within the content, they will likely struggle with various goals and levels of complexity, thus limiting the flexibility of instruction. Therefore, it is important for teacher educators and professional developers to emphasize that special education teachers must



collaborate with general education content experts to identify critical content, and if they are not comfortable with the content, they should, in time, gain some of the content expertise.

While introducing the checkpoints, teacher educators and professional developers should consider two primary tools (see <http://www.udlcenter.org/aboutudl/udlguidelines/>) provided by the National Center on Universal Design for Learning (2012). These tools structure the guidelines and corresponding checkpoints under the three respective principles so that teachers can use the guidelines and the basic elements of UDL to improve planning and the subsequent instructional experiences of students. The checkpoints guide teachers through an understanding of the principles and guidelines that extends beyond a definition to support the implementation of UDL. For example, the National Center on Universal Design for Learning defines the checkpoints; explains the potential barriers and how the principles and guidelines address content and instructional limitations; and offers examples and links to resources, giving teachers solutions and tools for subsequent implementation.

2.0 Planning Instruction Using the Universal Design for Learning Framework

2.1 Proactively plan instruction using the Universal Design for Learning three principles, nine guidelines, and accompanying checkpoints. Before teachers can begin to learn about UDL implementation, they must first understand how to implement the three UDL principles by using the guidelines and checkpoints as flexible implementation options. There are instructional planning frameworks that can be introduced to new implementers of UDL to help them plan instruction consistent with the UDL framework. One such framework Meo (2008) described is called Planning for All Learners (PAL), which is available in the Resources section of the National Center on Universal Design for Learning (2012) website (http://www.udlcenter.org/resource_library/articles/hs_reading). The PAL process offers a



practical four-step process for collaboratively implementing UDL: (1) setting goals, (2) analyzing the current status of the curriculum and classroom, (3) applying the UDL framework to lesson and unit development, and (4) teaching these UDL-aligned lessons and units. This process is intended to be collaborative, and members of the instructional team can rely on each other to gain the information and expertise necessary to effectively implement UDL. The Universal Design for Learning-Implementation and Research Network (UDL-IRN, 2011) offers another framework; it provides teachers with a five-step instructional planning framework based on critical elements of UDL instruction and a backwards design instructional process that includes five steps: (1) establish clear goals, (2) anticipate learner variability, (3) establish measurable outcomes and an assessment plan, (4) establish an instructional sequence of events, and (5) reflect on the instructional process. The UDL-IRN website (<https://james-basham.squarespace.com/instructional-process/>) describes in detail these five steps.

Pre- and in-service teachers are often overwhelmed when introduced to a UDL planning framework because unlike rigid curricula and benchmarks, the UDL framework is broad and offers many instructional choices. It is important, therefore, to offer concrete strategies for implementation. Examples that teacher educators and professional developers can use are as follows:

- Evaluate from a UDL perspective the instruction that pre- or in-service teachers see in their field experiences and instructional settings or specific curricula (e.g., social studies, language arts, science unit). Teachers can reflect on
 - components of that instruction that are consistent with the UDL framework,
 - components of that instruction that are inconsistent with the UDL framework, and



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- recommendations for how they may implement that instruction from a UDL perspective.
 - Design instruction in groups so that different teachers focus on different principles, guidelines, and checkpoints. Teachers can then
 - share their lesson ideas and evaluate the different instructional choices within these lesson ideas to reinforce the idea that there are multiple ways to deliver instruction using the UDL framework and
 - discuss whether the lesson implementation, when examined as a whole, would meet the needs of specific student case examples so that the students can reflect on how the designed lessons would meet the needs of diverse learners.

2.2 Create and evaluate learning environments that align with the Universal Design for Learning framework. Because instruction occurs across many learning environments, it is important that teacher preparation PD related to UDL address the role of the learning environments (e.g., the classrooms and other instructional areas in which learning takes place). These learning environments contain the technologies, resources, and supports with which students and teachers interact during learning. Teachers should receive opportunities to evaluate from a UDL perspective the physical instructional spaces as well as the resources within these spaces. Can students physically access all the resources within the environment? Is the space conducive to the types of instructional delivery planned through the UDL framework (e.g., physical layout, use of specific technologies)? For example, in a mathematics lesson that makes use of multiple means of representing the concept of a number line, does the physical space have room for various manipulatives, online materials that students can access through computers or mobile devices, and a space for students to collaboratively solve problems?



Strategies for helping teachers create and assess learning environments from a UDL perspective are as follows:

- While teachers learn about environmental or ecological inventories, they can simultaneously evaluate environments from a UDL perspective.
- While creating or evaluating lesson plans, teachers can include a section devoted to the learning environment so that they learn to consider the environment within their lesson planning processes.

2.3 Identify and strategically use materials, curricula, and technologies that align instruction with the Universal Design for Learning framework. It is widely accepted that many students with disabilities have difficulty accessing instructional curriculum for a wide variety of reasons such as text difficulty (e.g., Mastropieri, Scruggs, & Graetz, 2003; Swanson, Edmonds, Hairrell, Vaughn, & Simmons, 2011) and lack of metacognitive strategies (e.g., Faggella-Luby, Graner, Deshler, & Drew, 2012). It is important that teachers have opportunities to identify and use materials, curricula, and technologies that are accessible and meet the needs of diverse learners. See the Culturally Responsive Teaching IC (Aceves & Orosco, 2014).

UDL implementation research related to accessible materials and curricula focuses on how instructional materials can be used in a flexible manner and altered to meet the needs of individual learners (Abell, 2006). Discussions about UDL and technology often concurrently occur because technology can enhance teaching and learning through the UDL framework due to the power of technology to act as an equalizer, empower students, and encourage independence (Edyburn, 2005). Initial research on the use of technology to support teaching and learning through the UDL framework (e.g., Basham, Meyer, & Perry, 2010; Dalton, Proctor, Uccelli, Mo, & Snow, 2011; Marino et al., 2013) has pointed toward the adaptability and individualization



afforded to learning by the flexibility inherent within technologies such as gaming, digital text, text-to-speech software, media-rich experiences, and flexible technology-based assessment systems.

Israel and Marino (2014) discussed integrating technology into teaching and learning, including its use within the UDL framework. Several strategies to provide teachers with experiences that enhance their understanding and use of materials, curricula, and technologies that align with the UDL framework are as follows:

- Compare and contrast technology and AT within the UDL framework and the role of AT and general instructional technologies within the UDL framework. It is important to stress that although UDL proactively addresses the needs of diverse learners, there will always be students who require individualization from technology (i.e., AT) and instructional planning perspectives. The distinction between AT and technologies used within the UDL framework is that AT meets the individual needs of a learner with disabilities while general instructional technologies are those designed to be used by any learner who may benefit from their use (Basham, Israel, & Maynard, 2010). Thus, AT use by individual students concurrently occurs alongside UDL-based materials and technologies for all learners.
- Emphasize that materials and technologies used within the UDL framework should be considered tools (UDL-IRN, 2011) to enhance curricula and make it more engaging and assessable. Teacher educators should be aware that too often, teachers think that by using technology, they are “doing UDL.” For example, just because a teacher is using Clicker software (i.e., a reading-and-writing-based technology tool) does not mean that the teacher has fully considered the UDL framework. Teacher educators



should, therefore, emphasize instruction and pedagogy and the way in which technologies support and enhance teaching and learning rather than simply assuming that the use of technology results in increased access, learning, and engagement.

- Assess the degree to which materials and technologies enhance learning, meaningful access, and engagement. While considering these materials and technologies through the lens of UDL, teachers can evaluate whether the materials and technologies are appropriate for the desired learning tasks and outcomes. This should occur throughout instruction related to lesson planning, lesson evaluation, and general discussions of technology integration as well as throughout instruction related to UDL.
- Extend technology consideration beyond access. Too often, access to content or instruction is deemed effective and aligned with the UDL framework. For example, text-to-speech through services like Bookshare (<https://www.bookshare.org/>) or speech-to-text through applications like Dragon Naturally Speaking (<http://www.nuance.com/>) are highlighted as effective UDL-aligned tools and are showcased as UDL in action. Teacher educators should emphasize that although these tools provide access to content, they do not offer the scaffolds and embedded supports needed for subsequent learning. Thus, access afforded by such technologies is a part of UDL but does not represent the entire framework. An analogy to present to teachers could be to keep in mind the traditional classroom accessibility efforts via automatic doors, automatic classroom lights, and wider entryways to accommodate wheelchairs; these solutions offer entry into the classroom but do not alter the content or instruction once students are there.



2.4 Use progress monitoring and data-based decision making to inform instruction and student learning in order to provide timely mastery-oriented feedback. The UDL literature base showcases that there is a complex interaction between progress monitoring, understanding the interplay between student performance and UDL-based instruction and environmental factors, and the ways in which teachers provide feedback to their students. Consequently, it is important for teacher educators to consider how to embed experiences related to progress monitoring, data-based decision making, and mastery-oriented feedback within the UDL framework.

The UDL framework relies heavily on general literature related to progress monitoring, and there is a great deal of support for the effectiveness of timely progress monitoring unrelated to UDL (e.g., Ardoin, Witt, Connell, & Keonig, 2005; Fuchs, Fuchs, Hamlett, & Allinder, 1991; Stecker, Fuchs, & Fuchs, 2005; Stecker, Lembke, & Foegen, 2008). All of this literature has pointed to the need to include timely progress monitoring as part of instruction for students with disabilities and struggling learners.

Edyburn (2010) and Basham, Israel, Graden, Poth, and Winston (2010) provided examples of how the UDL literature relies on this research in discussions about the relationship between data-based decision making based on timely progress monitoring and the UDL framework. Edyburn (2010) explained that the need for data-based decision making is a critical aspect of teaching through the UDL framework. Basham, Israel, Graden, and colleagues (2010) described how multi-tiered systems of supports (MTSS) should have UDL embedded throughout the tiers of instruction with all students receiving effective core instruction that is planned and implemented through the UDL framework in Tier 1 and then should have progressively more



individualized and intensive instruction based on timely progress monitoring as students require increased levels of support.

Because teacher educators already address progress monitoring and data-based decision making, doing so within the context of UDL would be a natural fit. This should be done with both student- and environmental-level data as part of evaluating the instructional environment. Although student-level progress monitoring data are typically gathered, students' learning environments are not assessed to the same degree.

To support the implementation of UDL, teacher educators and professional developers should provide experiences that allow teachers to consider which elements of the learning environment support or impede learning. While collecting student-level data, teachers should also consider ways of providing feedback to students in a manner that guides students toward success. In this way, teachers will begin to see the relationship between assessment practices and students' goals, motivation, and performance. This is important because research has revealed that providing students with feedback on their learning and performance helps them persevere, makes them aware of how their effort translates into success, and improves their attitudes about themselves as learners. When teachers focus on providing mastery-oriented feedback, students are more likely to invest in the learning process for the sake of learning, and they see increases in self-efficacy, persistence, and self-regulation (Kaplan & Maehr, 2007; Schunk & Cox, 1986; Zimmerman, 1990).

2.5 Strategically integrate evidence-based practices into Universal Design for Learning planning, teaching, and assessment. As previously mentioned, UDL is not considered an EBP, but it provides an instructional framework in which EBPs should be embedded. Therefore, as teachers start to understand how the UDL framework meets the needs



of diverse learners, it is critical to help them understand how to embed effective instruction within the UDL framework. As they learn about different EBPs, therefore, teachers should have opportunities to see how these practices fit within the UDL framework. Opportunities are as follows:

- While teaching about different EBPs, provide examples of how students would be taught within the UDL framework. For example, while teaching about mathematics practices that provide opportunities for students to have concrete examples of mathematical concepts, illustrate how to provide multiple means of representation using manipulatives, virtual manipulatives, and opportunities to access information through online resources. While teaching about instructional strategies in writing or reading that make use of modeling, guided practice, independent practice, and generalization, illustrate how students can integrate different means of expressing their understanding beyond paper-and-pencil assessments, gain access to technologies to support understanding, and monitor their progress.
- While teaching about implementing EBPs, discuss the EBPs by filtering them through the UDL framework, using the guidelines and checkpoints to identify additional tools that can maximize the impact of the intervention and potentially extend its usefulness to a larger set of learners.

Conclusion

This UDL IC (see Appendix) was created to offer practical recommendations intended to assist and guide general and special education teacher preparation programs as both general and special education teachers instruct students with diverse needs, including students with



disabilities. This assistance and guidance will better prepare teachers to effectively instruct the range of learners in their classrooms.



References

- Abell, M. (2006). Individualizing learning using intelligent technology and universally designed curriculum. *Journal of Technology, Learning, and Assessment*, 5(3). Retrieved from <http://www.jtla.org>
- Aceves, T. C., & Orosco, M. J. (2014). *Culturally responsive teaching* (Document No. IC-2). Retrieved from University of Florida, Collaboration for Effective Educator, Development, Accountability, and Reform Center website: <http://cedar.education.ufl.edu/tools/innovation-configurations/>
- Ardoin, S. P., Witt, J. C., Connell, J. E., & Koenig, J. L. (2005). Application of a three-tiered response to intervention model for instructional planning, decision making, and the identification of children in need of services. *Journal of Psychoeducational Assessment*, 23, 362-380. doi:10.1177/073428290502300405
- Assistive Technology Act of 1998, 29 U.S.C. § 3002 (2004).
- Basham, J. D., Israel, M., Graden, J., Poth, R., & Winston, M. (2010). A comprehensive approach to RtI: Embedding Universal Design for Learning and technology. *Learning Disability Quarterly*, 33(4), 243-255.
- Basham, J. D., Israel, M., & Maynard, K. (2010). Developing an ecological model for STEM education: Operationalizing STEM for all. *Journal of Special Education Technology*, 25(3), 9-19.
- Basham, J. D., Meyer, H., & Perry, E. (2010). The design and application of the digital backpack. *Journal of Research on Technology in Education*, 42, 339-359. doi:10.1080/15391523.2010.10782555



Bouck, E. C., Courtad, C. A., Heutsche, A., Okolo, C. M., & Englert, C. S. (2009). The virtual history museum: A universally designed approach to social studies instruction. *Teaching Exceptional Children*, 42(2), 14-20.

Center for Applied Special Technology (CAST). (2011). *Universal Design for Learning guidelines* (Version 2.0). Wakefield, MA: Author. Retrieved from <http://www.udlcenter.org/aboutudl/udlguidelines>

Common Core State Standards. (2012). *Application to students with disabilities*. Retrieved from <http://www.corestandards.org/assets/application-to-students-with-disabilities.pdf>

Courey, S. J., Tappe, P., Siker, J., & LePage, P. (2012). Improved lesson planning with Universal Design for Learning (UDL). *Teacher Education and Special Education*, 20, 1-21.
doi:10.1177/0888406412446178

Curry, C., Cohen, L., & Lightbody, N. (2006). Universal design in science learning. *Science Teacher*, 73(3), 32-37.

Dalton, B., Proctor, C. P., Uccelli, P., Mo, E., & Snow, C. E. (2011). Designing for diversity: The role of reading strategies and interactive vocabulary in a digital reading environment for fifth-grade monolingual English and bilingual students. *Journal of Literacy Research*, 43, 68-100. doi:10.1177/1086296X10397872

Edyburn, D. L. (2005). Assistive technology and students with mild disabilities: From consideration to outcome measurement. In D. L. Edyburn, K. Higgins, & R. Boone (Eds.), *Handbook of special education technology research and practice* (pp. 239-270). Whitefish Bay, WI: Knowledge by Design.



-
- Edyburn, D. L. (2010). Would you recognize Universal Design for Learning if you saw it? Ten propositions for new directions for the second decade of UDL. *Learning Disability Quarterly*, 33, 33-41.
- Edyburn, D. L. (2013). Critical issues in advancing the special education technology evidence base. *Exceptional Children*, 80(1), 7-24.
- Faggella-Luby, M. N., Graner, P. S., Deshler, D. D., & Drew, S. V. (2012). Building a house on sand: Why disciplinary literacy is not sufficient to replace general strategies for adolescent learners who struggle. *Topics in Language Disorders*, 32(1), 69-84.
doi:10.1097/TLD.0b013e318245618e
- Fuchs, L. S., Fuchs, D., Hamlett, C. L., & Allinder, R. M. (1991). Effects of expert system advice within curriculum-based measurement on teacher planning and student achievement in spelling. *School Psychology Review*, 20, 49-66.
- Hall, G. E., & Hord, S. M. (1987). *Change in schools: Facilitating the process*. Albany, NY: State University of New York Press.
- Hall, G. E., & Hord, S. M. (2001). *Implementing change: Patterns, principles, and potholes*. Boston, MA: Allyn & Bacon.
- Hall, G. E., Loucks, S. F., Rutherford, W. L., & Newton, B. W. (1975). Levels of use of the innovation: A framework for analyzing innovation adoption. *Journal of Teacher Education*, 26, 52-56. doi:10.1177/002248717502600114
- Hall, T. E., Meyer, A., & Rose, D. H. (2012). *Universal Design for Learning in the classroom: Practical applications*. New York, NY: Guilford.



-
- Hehir, T. (2009). Policy foundations of Universal Design for Learning. In D. T. Gordon, J. W. Gravel, & L. A. Schifter (Eds.), *A policy reader in Universal Design for Learning* (pp. 35-45). Cambridge, MA: Harvard Education Press.
- Higher Education Opportunity Act of 2008, 20 U.S.C. § 1022d(b)(1)(K) (2008).
- Hord, S. M., Rutherford, W. L., Huling-Austin, L., & Hall, G. E. (1987). *Taking charge of change*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Individuals With Disabilities Education Act, 20 U.S.C. § 1400 (2004).
- Israel, M., & Marino, M. T. (2014). *Innovation configuration on supporting K-12 students with disabilities in content learning through technology* (Document No. IC-10). Retrieved from University of Florida, Collaboration for Effective Educator Development, Accountability, and Reform Center website:
<http://cedar.education.ufl.edu/tools/innovation-configurations/>
- Kaplan, A., & Maehr, M. L. (2007). The contributions and prospects of goal orientation theory. *Educational Psychology Review*, 19, 141-184. doi:10.1007/s10648-006-9012-5
- Marino, M. T., Gotch, C., Israel, M., Vasquez, E. III, Basham, J. D., & Becht, K. (2013). UDL in the middle school science classroom: Can video games and alternative text heighten engagement and learning for students with learning disabilities? *Learning Disability Quarterly*. Advance online publication. doi:10.1177/0731948713503963
- Mastropieri, M. A., Scruggs, T. E., & Graetz, J. (2003). Reading comprehension for secondary students. *Learning Disability Quarterly*, 26, 103-116.
- Meo, G. (2008). Curriculum planning for all learners: Applying Universal Design for Learning (UDL) to a high school reading comprehension program. *Preventing School Failure: Alternative Education for Children and Youth*, 52(2), 21-30. doi:10.3200/PSFL.52.2.2-30



-
- Meyer, A., & Rose, D. H. (2005). The future is in the margins: The role of technology and disability in educational reform. In D. H. Rose, A. Meyer, & C. Hitchcock (Eds.), *The universally designed classroom: Accessible curriculum and digital technologies*, (pp. 13-35). Cambridge, MA: Harvard Education Press.
- National Center on Universal Design for Learning. (2012). UDL in your state. Retrieved from <http://www.udlcenter.org/advocacy/state>
- Nelson, L. L. (2013). *Design and deliver: Planning and teaching using Universal Design for Learning*. Baltimore, MD: Brooks Publishing.
- No Child Left Behind Act of 2001, 20 U.S.C. § 6319 (2008).
- Rose, D. H., & Gravel, J. W. (2010). Universal Design for Learning. In B. McGaw, P. Peterson, & E. Baker (Eds.), *International encyclopedia of education* (3rd ed., pp. 119-124). Oxford, England: Elsevier Science.
- Rose, D. H., & Meyer, A. (2002). *Teaching every student in the digital age: Universal Design for Learning*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Roy, P., & Hord, S. M. (2004). Innovation configurations chart a measured course toward change. *Journal of Staff Development*, 25(2), 54-58.
- Schunk, D. H., & Cox, P. D. (1986). Strategy training and attributional feedback with learning disabled students. *Journal of Educational Psychology*, 78(3), 201-209.
doi:10.1037//0022-0663.78.3.201



-
- Smith, D. D., Robb, S. M., West, J., & Tyler, N. C. (2010). The changing education landscape: How special education leadership preparation can make a difference for teachers and their students with disabilities. *Teacher Education and Special Education*, 33(1), 25-43. doi:10.1177/0888406409358425
- Spooner, F., Baker, J. N., Harris, A. A., Ahlgrim-DeLzell, L., & Browder, D. M. (2007). Effects of training in Universal Design for Learning on lesson plan development. *Remedial and Special Education*, 28, 108-116. doi:10.1177/07419325070280020101
- Stecker, P. M., Fuchs, L. S., & Fuchs, D. (2005). Using curriculum-based measurement to improve student achievement: Review of research. *Psychology in the Schools*, 42(8), 795-819. doi:10.1002/pits.20113
- Stecker, P. M., Lembke, E. S., & Foegen, A. (2008). Using progress monitoring data to improve instructional decision making. *Preventing School Failure*, 52(2), 48-58.
- Swanson, E., Edmonds, M. S., Hairrell, A., Vaughn, S., & Simmons, D. C. (2011). Applying a cohesive set of comprehension strategies to content-area instruction. *Intervention in School and Clinic*, 46(5), 266-272. doi:10.1177/1053451210395385
- Universal Design for Learning-Implementation and Research Network (UDL-IRN). (2011). *Critical elements of UDL in instruction* (Version 1.2). Lawrence, KS: Author.
- U.S. Department of Education, Office of Educational Technology. (2010). *National education technology plan 2010*. Washington, DC: Author. Retrieved from <http://www.ed.gov/sites/default/files/netp2010-execsumm.pdf>
- Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, 25(1), 3-17. doi:10.1207/s15326985ep2501_2



Appendix

Innovation Configuration for Universal Design for Learning

Essential Components	Implementation Levels				
<p>Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.</p>	Level 0	Level 1	Level 2	Level 3	Rating
	<p>There is no evidence that the component is included in the syllabus, or the syllabus only mentions the component.</p>	<p>Must contain at least one of the following: reading, test, lecture/presentation, discussion, modeling/demonstration, or quiz.</p>	<p>Must contain at least one item from Level 1, plus at least one of the following: observation, project/activity, case study, or lesson plan study.</p>	<p>Must contain at least one item from Level 1 as well as at least one item from Level 2, plus at least one of the following: tutoring, small group student teaching, or whole group internship.</p>	<p>Rate each item as the number of the highest variation receiving an X under it.</p>
1.0 General Understanding of the UDL					
<p>1.1 - Understand how the UDL framework can reduce barriers to learning and support high expectations for learning.</p> <p>1.2 - Understand how the four curricular pillars of UDL implementation (i.e., goals, instruction, materials, and assessment) are applied in different instructional contexts.</p> <p>1.3 - Understand the three principles of the UDL framework and how they apply to instructional planning, instruction, and the environment.</p> <p>1.4 - Understand how the nine UDL guidelines and accompanying</p>					



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1.0 General Understanding of the UDL					
<p>checkpoints can be used to create instructional environments that support learning.</p>					



Essential Components	Implementation Levels				
<p>Instructions: Place an X under the appropriate variation implementation score for each course syllabus that meets the criteria level from 0 to 3. Score and rate each item separately.</p>	Level 0	Level 1	Level 2	Level 3	Rating
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2.0 Planning Instruction Using the UDL Framework					
<p>2.1 - Proactively plan instruction using the UDL principles, guidelines, and accompanying checkpoints.</p> <p>2.2 - Create and evaluate learning environments that align with the UDL framework.</p> <p>2.3 - Identify and strategically use materials, curricula, and technologies to align instruction with the UDL framework.</p> <p>2.4 - Use progress monitoring and data-based decision making to inform instruction and student learning in order to provide timely mastery-oriented feedback.</p> <p>2.5 - Strategically integrate EBPs into UDL planning and teaching.</p>					

