Differentiated Instruction and Implications for UDL Implementation

Effective Classroom Practices Report

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# Differentiated Instruction and Implications for UDL Implementation

## Introduction

Today, teachers are continually faced with the challenge of effectively reaching out to their classroom of students who span the spectrum of learning readiness, personal interests, skills, knowledge, and perspective. We know that not all students are alike. Based on this knowledge, differentiated instruction applies an approach to teaching and learning that gives students multiple options for taking in information and making sense of ideas. Differentiated instruction is a teaching theory based on the premise that instructional approaches should vary and curriculum be adapted in relation to individual and diverse students in classrooms (Tomlinson, 2014). The model of differentiated instruction requires teachers to be flexible in their approach to teaching and adjust the curriculum and presentation of information to learners rather than expecting students to modify themselves for the curriculum. Many teachers and teacher educators have recently identified differentiated instruction as a method of helping more students in diverse classroom settings experience success. As Tomlinson states, “Teachers who differentiate provide specific alternatives for individuals to learn as deeply as possible and as quickly as possible without assuming that one student’s road map to learning is identical to anyone else’s” (Tomlinson, 2014).

This document examines information on the theory and research behind differentiated instruction and its intersection with Universal Design for Learning (UDL), an educational framework that is based on research from the neurosciences and effective teaching practices designed to increase flexibility in teaching, decrease barriers, and optimize learning for all (Rose & Meyer, 2014). We begin with an introduction to differentiated instruction by defining the construct, then identify components and features by providing a sampling of considerations and curriculum applications and research evidence for effectiveness. Next, we introduce UDL and the connections with differentiated instruction both in theory and with specific lesson examples. Our document concludes with general guidelines for the implementation of UDL and a list of web resources that provide further information about differentiated instruction.

## Definition

To differentiate instruction is to recognize students’ varying background knowledge, readiness, language, preferences in learning and interests; and to react responsively. As Tomlinson notes in her recent book *Differentiated Classroom: Responding to the Needs of All Learners* (2014), teachers in a differentiated classroom begin with their current curriculum and engaging instruction. Then they ask, what will it take to *alter or modify* the curriculum and instruction so that so that each learner comes away with knowledge, understanding, and skills necessary to take on the next important phase of learning. Differentiated instruction is a process of teaching and learning for students of differing abilities in the same class. Teachers, based on characteristics of their learners’ readiness, interest, learning profile, may adapt or manipulate various elements of the curriculum (content, process, product, affect/environment). These are illustrated in Table 1 below which presents the general principles of differentiation by showing the key elements of the concept and relationships among those elements.

Table 1. Principles of Differentiation.

Differentiation is a teacher’s response to learners’ needs. 
Guided by a growth mindset and general principles of differentiation: supportive learning environment; quality curriculum; teaching up; flexible grouping; respectful tasks; continual assessment to inform teaching and learning. 
Teachers can differentiate through: content; process; product; affect; learning environment. 
According to students’: readiness; interest; learning profile.
Using a variety of instructional approaches such as: RAFTs; graphic organizers; scaffolded reading; cubing; think-tac-toe; learning contracts; tiering; learning/interest centers; independent studies; intelligence preferences; orbitals; complex instruction; technology; web quests & web inquiry.

Adapted with permission from Carol Tomlinson: Differentiation Central ***[Institutes on Academic Diversity](http://curry.virginia.edu/go/iad/" \t "_blank)*** in the ***[Curry School of Education](http://curry.virginia.edu/" \t "_blank)*** at the ***[University of Virginia](http://www.virginia.edu" \t "_blank)*** (September 2014)

## Identifying Components/Features

While Tomlinson and most recognize there is no magic or recipe for making a classroom differentiated, they have identified guiding principles, considered the “Pillars that Support Effective Differentiation”: Philosophy, Principles, and Practices. The premise of each is as follows:

The *Philosophy* of differentiation is based on the following tenets:

1. recognizing diversity is normal and valuable,
2. understanding every student has the capacity to learn,
3. taking responsibility to guide and structure student success,
4. championing every student entering the learning environment and assuring equity of access

The *Principles* identified that shape differentiation include—

1. creating an environment conducive to learning
2. identifying a quality foundational curriculum
3. informing teaching and learning with assessments
4. designing instruction based on assessments collected
5. creating and maintaining a flexible classroom

Teacher *Practices* are also essential to differentiation, highlighted as—

1. *proactive planning* to address student profiles
2. *modifying instructional approaches* to meet student needs
3. *teaching up* (students should be working just above their individual comfort levels)
4. *assigning respectful tasks* responsive to student needs—challenging, engaging, purposeful
5. *applying flexible grouping* strategies (e.g., stations, interest groups, orbital studies)

According to the authors of differentiated instruction, several key elements guide differentiation in the education environment through which teachers may differentiate instruction: *content*, *process*, *product* and *affect/environment* (see Table 1) (Tomlinson, 2014). These are described in the four sections below, and they help to serve as guidelines for forming an understanding of and developing ideas around differentiation of instruction.

### Content

* *Several elements and materials are used to support instructional content.* These include acts, concepts, generalizations or principles, attitudes, and skills. The variation seen in a differentiated classroom is most frequently in the manner in which students gain access to important learning. Access to content is seen as key.
* *Align tasks and objectives to learning goals.* Designers of differentiated instruction view the alignment of tasks with instructional goals and objectives as essential. Goals are most frequently assessed by many state-level, high-stakes tests and frequently administered standardized measures. Objectives are frequently written in incremental steps resulting in a continuum of skills-building tasks. An objectives-driven menu makes it easier to find the next instructional step for learners entering at varying levels.
* *Instruction is concept-focused and principle-driven.* Instructional concepts should be broad-based, not focused on minute details or unlimited facts. Teachers must focus on the concepts, principles, and skills that students should learn. The content of instruction should address the same concepts with all students, but the degree of complexity should be adjusted to suit diverse learners.
* *Clarify key concepts and generalizations.* Ensure that all learners gain powerful understandings that can serve as the foundation for future learning. Teachers are encouraged to identify essential concepts and instructional foci to ensure that all learners comprehend.

### Process

* *Flexible grouping is consistently used.* Strategies for flexible grouping are essential. Learners are expected to interact and work together as they develop knowledge of new content. Teachers may conduct whole-class introductory discussions of content big ideas followed by small group or paired work. Student groups may be coached from within or by the teacher to support completion of assigned tasks. Grouping of students is not fixed. As one of the foundations of differentiated instruction, grouping and regrouping must be a dynamic process, changing with the content, project, and on-going evaluations.
* *Classroom management benefits students and teachers.* To effectively operate a classroom using differentiated instruction, teachers must carefully select organization and instructional delivery strategies. In her text, How to Differentiate Instruction in Mixed-Ability Classrooms (2001), Carol Tomlinson identifies 17 key strategies for teachers to successfully meet the challenge of designing and managing differentiated instruction.
* *Emphasize critical and creative thinking as a goal in lesson design.* The tasks, activities, and procedures for students should require that they understand and apply meaning. Instruction may require supports, additional motivation; and varied tasks, materials, or equipment for different students in the classroom.

### Products

* *Initial and on-going assessment of student readiness and growth are essential.* Meaningful pre-assessment naturally leads to functional and successful differentiation. Incorporating pre- and on-going assessment informs teachers so that they can better provide a menu of approaches, choices, and scaffolds for the varying needs, interests, and abilities that exist in classrooms of diverse students. Assessments may be formal or informal, including interviews, surveys, performance assessments, and more formal evaluation procedures.
* *Use assessment as a teaching tool to extend rather than merely measure instruction.* Assessment should occur before, during, and following the instructional episode; and it should be used to help pose questions regarding student needs and optimal learning.
* *Students are active and responsible explorers.* Teachers respect that each task put before the learner will be interesting, engaging, and accessible to essential understanding and skills. Each child should feel challenged most of the time.
* *Vary expectations and requirements for student responses.* Items to which students respond may be differentiated so that different students are able to demonstrate or express their knowledge and understanding in a variety of ways. A well-designed student product allows varied means of expression and alternative procedures and offers varying degrees of difficulty, types of evaluation, and scoring.

### Affect/Environment

* *Developing a learning environment.* Establish classroom conditionsthat set the tone and expectations for learning. Provide tasks that are challenging, interesting, and worthwhile to students.
* *Engaging all learners is essential.* Teachers are encouraged to strive for the development of lessons that are engaging and motivating for a diverse class of students. Vary tasks within instruction as well as across students. In other words, an entire session for students should not consist of all lecture, discussion, practice, or any single structure or activity.
* *Provide a balance between teacher-assigned and student-selected tasks.* A balanced working structure is optimal in a differentiated classroom. Based on pre-assessment information, the balance will vary from class-to-class as well as lesson-to-lesson. Teachers should ensure that students have choices in their learning.

## Evidence of Effectiveness as a Classroom Practice

Tomlinson, Brighton, Hertberg, Callahan, Moon, Brimijoin, Conover, and Reynolds (2003), completed a review of the theory and research supporting differentiation. Differentiation is noted to be recognized as a compilation of many theories and practices each of which has a research base supporting the concept or practice. Far fewer research studies have been reported on the gains for students in classrooms where the principles and elements of differentiation were effectively employed. Tomlinson, et al. (2003) noted two dissertation studies (Brimijoin, 2001 and Tieso, 2002) that showed achievement gains for students with differentiation in the classroom. Measures indicating positive mean student outcomes included pre- and post-tests in one case; and in a second case, state standards assessments. Although there is a growing collection of research, an acknowledged and decided gap in the literature in this area still exists and continued research is warranted.

Proponents of differentiation note the principles and guidelines are rooted in years of educational theory and research. For example, differentiated instruction employs the element of “readiness” or challenges. That is, the difficulty of skills taught should be slightly in advance of the student’s current level of mastery. This is grounded in the work of Lev Vygotsky (1978) and in the zone of proximal development (ZPD)—the range at which learning takes place. Classroom research by Fisher strongly supports the ZPD concept. Researchers have noted that in classrooms where individuals were performing at a level of about 80% accuracy, students learned more than control condition students, and felt better about themselves and the content subject under study (Fisher, 1980 in Tomlinson, 2000).

Other practices and elements noted as central to differentiation have been validated in the effective teaching research conduced from the mid 1980’s to the present. These practices include effective management procedures, grouping students for instruction, and engaging learners (Ellis and Worthington, 1994).

While little empirical validation of differentiated instruction as a package was found for this review, there are a generous number of testimonials and classroom examples that authors of several publications and web sites provide. Tomlinson has made available many case examples of settings in which the full model of differentiation was very promising. Additionally, many teachers using differentiation have written, created videos, and shared on social media their experiences about classroom improvements when applying differentiation. (See *links to learn more about differentiated instruction*).

## Applications to General Education Classroom Settings

The design and development of differentiated instruction as a model began in the general education classroom. The initial application came to practice for students considered gifted but perhaps not sufficiently challenged by the content provided in the general classroom setting. As classrooms have become more diverse, differentiated instruction has been applied at all levels for students of all abilities (Tomlinson, 2014).

Many authors of publications about differentiated instruction strongly recommend that teachers adapt the practices slowly, perhaps one content area at a time. Additionally, these experts agree that teachers should share the creative load by working together to develop ideas and menus of options for students. A number of web sites have been created that include lessons to illustrate what teachers have created for instruction using the model of differentiated instruction. Several web sites are listed in a later section of this document.

Currently, most information on differentiated instruction is focused on applications in kindergarten through 12th grade settings. Most research and illustrations of differentiation are available for the elementary grades, with a growing number addressing application and instruction at secondary levels. Although current literature and web information does not directly address college and career readiness, the principles and recommended practices fundamental to differentiation support the goals that high school graduates complete their K–12 education with the knowledge and skills necessary to qualify for and succeed in postsecondary education and/or chosen careers.

Differentiated instruction is an instructional process that has potential to positively impact learning by offering teachers means to provide instruction to a range of students in today’s classroom situations. The next section of this document introduces the reader to the theory and research behind Universal Design for Learning (UDL). We then investigate the links and connections between UDL and differentiated instruction. Additionally, we identify methods and materials that may be used to support the implementation of differentiated instruction in concert with the principles of UDL. Finally, a set of guidelines for UDL implementation is provided including a listing of web resources to provide further information on the concepts presented in this document.

## An Introduction to Universal Design for Learning Applications

Universal Design for Learning (UDL) is a theoretical framework developed by CAST (the Center for Applied Special Technology) to guide the design and development of learning environments that represent materials in flexible ways and offers a variety of options for learners to comprehend information, demonstrate their knowledge and skills, and be motivated to learn (Meyer, Rose, & Gordon, 2014; Hall, Meyer, & Rose, 2012; CAST, 2011; Rose, Meyer, & Hitchcock, 2006; Pisha & Coyne, 2001; Rose, 2001; Rose & Dolan, 2000; Rose & Meyer, 2000a, 2000b, 2002; Rose, Sethuraman, & Meo, 2000). The concept of UDL was inspired by the universal design movement in architecture. This movement calls for the design of structures that anticipate the needs of individuals with disabilities and accommodate these needs from the outset. Universally designed structures are indeed more usable by individuals with disabilities, but in addition they offer unforeseen benefits for *all* users. Curb cuts, for example, serve their intended use of facilitating the travel of those in wheelchairs, but they are also beneficial to people pushing strollers, young children, and even the average walker. And so, the process of designing for individuals with disabilities has led to improved usability for everyone.

The universal design movement changed how architects think about designing buildings. Similarly, UDL calls for a shift in how educators think about designing learning environments. Traditional curricula in printed text and new curricula that incorporate inaccessible digital technology present a host of barriers that limit learners’ access to information, ability to express knowledge, and ability to be engaged in learning. With printed text, learners without a well-developed ability to see, decode, attend to, or comprehend printed text are compelled to adapt to its ubiquity as best they can. Similarly, if new curricula in a digital medium are not fully accessible from the start, not all learners will be able to navigate, interact, comprehend, or express their knowledge.

What is even more detrimental to learning is that fixed, one-size-fits-all curricula are designed and developed to address the needs of mainstream learners and, consequently, disregard the diversity in skills, needs, and interest that individuals bring to learning. In contrast, a UDL curriculum is designed and developed to take full advantage of the inherent variability in individual learners. As a result, a UDL curriculum is innately flexible, enriched with multiple media so that many paths are provided to develop the talents of all learners. In doing so, a UDL curriculum reduces barriers as well as optimizes the level of challenges and supports to meet the needs of learners from the start.

The UDL framework is based on neuroscience research evidence that individual learners differ in the ways in which they are motivated (affective network), how they comprehend information (recognition network), and how they express what they know (strategic network). Whether the differences facilitate learning or become a detriment to learning depends largely on the educational context. If a learning environment is flexible and can be adjusted to match an individual’s strengths, then a characteristic that is a deficit in one learning context becomes an asset in another. The characteristics of a learner and the curriculum are not fixed entities, but continuously evolve together as the learner grows and progresses. As Meyers, Rose, and Gordon explain, “Success occurs when the learner and the curriculum interact in ways that help them both improve at the same time” (2014).

To guide educators in creating lessons, curricula, and learning systems that are engaging, maximize flexibility, and optimize learning, the three primary brain networks are translated into three UDL principles of design: 1) provide multiple means of engagement, 2) provide multiple means of representation, and 3) provide multiple means of action and expression (see Figure 1) (Rose, Meyer, & Gordon 2014).

Figure 1. The three primary brain networks and their relation to UDL.Affective networks: THE WHY OF LEARNING
Graphic of the human brain with the affective network highlighted in green.
How learners get engaged and stay motivated. How they are challenged, excited, or interested. These are affective dimensions.
Green arrow points to: Stimulate interest and motivation for learning. 

Recognition networks: THE WHAT OF LEARNING
Graphic of the human brain with the recognition network highlighted in purple
How we gather facts and categorize what we see, hear, and read. Identifying letters, words, or an author’s style are recognition tasks.
Purple arrow points to: Present information and content in different ways.

Strategic networks: THE HOW OF LEARNING
Graphic of the human brain with the strategic network highlighted in blue
Planning and performing tasks. How we organize and express our ideas. Writing an essay or solving a math problem are strategic tasks.
Blue arrow points to: Differentiate the ways that students can express what they know.


The three UDL principles call for flexibility in relation to three essential facets of learning, each one orchestrated by a primary brain network. Each UDL principle is then expanded into UDL guidelines and checkpoints. The depth and comprehensiveness of the UDL guidelines can guide educators to build flexibility into all components of a curriculum—goals, methods, materials, and assessment—so that all students are supported in their access, participation, engagement, and ongoing monitoring of progress across all facets of learning.

Although the three primary brain networks that facilitate learning are described separately, they are in fact highly interconnected and continuously work in concert. Similarly, the components of a curriculum—goals, assessment, methods, and materials—are most effective when they are aligned. The flexibility that is at the core of a UDL curriculum is the result of crafting goal statements that avoid prescribing a particular way to achieve them. Learning goals that separate the means from the end provide educators the flexibility to include a variety of teaching methods and materials that can be adjusted to match student needs and strengths. For example, if the learning goal is for students to understand a specific content piece then multiple options can be built into the curriculum for students to interact with that content (recognition network), for them to demonstrate their understanding of it (strategic network), and to engage and sustain their motivation in learning (affective network). Additionally, to make appropriate adjustments during the course of instruction requires assessments that are ongoing, measure student progress, and capture student interactions with the curriculum. In a UDL curriculum, formative assessment, which is employed during instruction to monitor student progress and inform instructional decisions, is more valuable than summative assessments that measure student performance after the completion of instruction. Likewise, digital curricula that log student actions and then generate visual reports of students’ paths through a curriculum overtime is more valuable than traditional curricula that don’t capture student interaction with the curricula. *Designing curriculum that adheres to the UDL principles insures that the goals, methods, materials, and assessments work seamlessly together to optimize learning.*

One of the most essential ingredients of an effective curriculum is engaging students in learning. In a UDL curriculum, involving students in the process of setting a learning goal is as critical to its achievement as the goal statement itself. Having students re-state goals in their own words, asking students for feedback about goals, and supporting students in setting goals for themselves are all critical to developing their self-efficacy and engagement in learning. Providing a rich array of materials and multiple paths to reach a goal not only recruits student interest and motivates them to learn but also provides opportunities for them to explore and develop their own interests. It is invaluable for educators to have immediate access to assessment information that they can use to inform instructional decisions as they are teaching. Similarly, involving students in monitoring their own progress by sharing information about their own learning behaviors and performances is empowering. When students view their own information, they ask and find answers to questions about themselves. What I am I doing? What is working? What can I improve? Thus assessment that is analyzing the identifying components often a source of anxiety and stress becomes an opportunity to practice self-regulation skills and develop self-efficacy, key factors of motivation in learning.

Figure 2. Three primary principles guide UDL—and provide structure for the Guidelines.

I. Provide Multiple Means of Representation
Perception
Language, expression, and symbols
Comprehension

II. Provide Multiple Means of Action and Expression
Physical action
Expression and communication
Executive function

III. Provide Multiple Means of Engagement
Recruiting interest
Sustaining effort and persistence
Self-regulation

To help teachers support learners’ diverse recognition, strategic, and affective networks CAST has developed three sets of UDL teaching methods. These teaching methods can be used to make curricula more flexible and broadly supportive.

## Differentiated Instruction and the Three Universal Design for Learning Principles

Differentiated instruction is well received as a classroom practice that may be well suited to the principles of UDL. The following section looks at the foundational principles of universal design for learning (UDL): engagement, action and expression, and representation—in order to address the ways in which differentiated instruction coordinates with UDL principles. Certain instructional techniques have been found to be very effective in supporting different skills as students learn. Differentiated instruction is designed to keep the learner in mind when specifying the instructional episode.

*Recognition networks.* The UDL principle that focuses on representation and the importance of providing multiple, flexible methods of presentation when teaching indicates that no single teaching methodology for representing information will be satisfactory for every learner. The theory of differentiated instruction incorporates some guidelines that can help teachers to support critical elements of recognition learning in a flexible way and promote every student’s success. Each of the four key elements of differentiated instruction (content, process, product, and affect/environment) supports an important UDL practice for meeting the needs of all learners.

The content guidelines for differentiated instruction support the UDL principle, *provide* *multiple means of representation,* in that they encourage the use of several elements and materials to support instructional content. A teacher following this principle might help students in a social studies class to understand the location of a state in the union by showing them a wall map or a globe, projecting a state map, or describing the location in words. Also, while preserving the essential content, a teacher could vary the difficulty of the material by presenting smaller or larger, simpler or more complex maps. For students with physical or cognitive disabilities, such a diversity of examples may be vital in order for them to access the pattern being taught. Other students may benefit from the same multiple examples by obtaining a perspective that they otherwise might not. In this way, a range of examples can help to ensure that each student’s recognition networks are able to identify the fundamental elements characterizing a pattern.

This same use of varied content examples supports a recommended UDL Guideline: *provide options for perception*. A wide range of tools for presenting instructional content are available, especially in the digital environment; thus teachers may manipulate size, color contrasts, audio, and other features to develop examples in multiple media and formats. These can be saved for future use and flexibly accessed by different students depending on their needs and preferences.

The pillars of differentiated instruction also recommend that content elements of instruction be kept concept-focused and principle-driven. This approach is consistent with the UDL Guideline *provide options for language, mathematical expression, and symbols*. By avoiding any focus on extensive facts or seductive details and reiterating broad concepts, a goal of differentiated instruction, teachers are highlighting essential components and better supporting recognition networks.

The UDL Guideline *provide options for comprehension*, and, in this context, the assessment step of the differentiated instruction learning cycle is instrumental. By evaluating student knowledge about a construct before designing instruction teachers can better support students’ knowledge base, scaffolding instruction in a very important way.

*Strategic networks****.*** People find for themselves the most desirable method of learning strategies; therefore, teaching methodologies need to be varied. This kind of flexibility is key for teachers to help meet the needs of their diverse students, and this is reflected in the UDL principle *provide multiple means of action and expression*. Differentiated instruction can support this practice in valuable ways.

Differentiated instruction recognizes the need for students to receive flexible models of skilled performance, which reflects the UDL Guideline *provide options for expression and communication*. As noted above, teachers implementing differentiated instruction are encouraged to demonstrate information and skills multiple times and at varying levels. As a result, learners enter the instructional episode with different approaches, knowledge, and strategies for learning.

When students are engaged in initial learning on novel tasks or skills, *providing graduated* *support for practice and performance* should be used to build fluency, ensure success, and support eventual independence. Supported practice enables students to split up a complex skill into manageable components and fully master those components. Differentiated instruction promotes this teaching method by encouraging students to be active and responsible learners and by asking teachers to respect individual differences and scaffold students as they move from initial learning to practiced, less-supported skills mastery.

In order to successfully demonstrate the skills that they have learned, students need *flexible opportunities for demonstrating skill.* Differentiated instruction directly supports this UDL checkpoint by reminding teachers to provide multiple options for learning and expressing knowledge, including the degree of difficulty and the means of evaluation or scoring.

*Affective networks.* Differentiated instruction and UDL bear another important point of convergence: recognition of the importance of engaging learners in instructional tasks. UDL calls for motivating and sustaining learner engagement through flexible instruction, an objective that differentiated instruction supports very effectively.

Differentiated instruction theory reinforces the importance of effective classroom management and reminds teachers of meeting the challenges of effective organizational and instructional practices. Engagement is a vital component of effective classroom management, organization, and instruction. Therefore teachers are encouraged to offer choices of tools, adjust the level of difficulty of the material, and provide varying levels of scaffolding to gain and maintain learner attention during the instructional episode. These practices bear much in common with the UDL principle *provide multiple means of engagement* by *offering choices of content and tools;* *providing adjustable levels of challenge*, and *offering a choice of learning context.* By providing varying levels of scaffolding when differentiating instruction, students have access to varied learning contexts as well as choices about their learning environment.

## Example of UDL and Differentiated Instruction

The focus of the previous sections was to describe ways in which differentiated instruction supports the three principles of UDL and aligns with UDL teaching practices. Here, we present actual a lesson plan employing differentiated instruction and we identified UDL features implemented in a well-designed differentiated instruction lesson in mathematics and recommend ways in which the UDL framework could be applied to make an even more accessible and more flexible lesson.

The[*Differentiation Central* web site](http://differentiationcentral.com/Lesson_Plans.html)provides many examples of differentiation and planning in the site’s resources section*.* A web site hosted by the [Institutes on Academic Diversity](http://curry.virginia.edu/go/iad/" \t "_blank) in the [Curry School of Education](http://curry.virginia.edu/" \t "_blank) at the [University of Virginia](http://www.virginia.edu" \t "_blank) contains a number of lessons with teacher examples of how to use differentiation in various grades and content areas. We have selected a mathematics lesson for 2nd grade focusing on the concept of number patterns.

The following instructional approach to teaching mathematics patterns has several UDL features (see Table 2). Through the use of clearly stated goals and the implementation of flexible working groups with varying levels of challenge, this lesson helps to break down instructional barriers. We have identified additional ways to reduce barriers in this lesson even further by employing the principles of UDL teaching methods and differentiated instruction. We provide recommendations of employing teaching methods of UDL to support this lesson in Table 3. Please note that we are not making generalized recommendations for making this lesson more UDL, but instead are focusing on ways that differentiated instruction, specifically, can help achieve this goal.

Table 2. UDL Elements in a Differentiated Instruction Mathematics Lesson

| **UDL Guideline/Checkpoint** | **Differentiated Instruction Features** |
| --- | --- |
| Provide multiple examples. | The teacher provides multiple examples throughout the lesson with multiple models, practice activities, and additional math problems. |
| Highlight critical features. | The teacher highlights critical features of the mathematics by stopping and calculating, checking in with students, and modeling behavior. |
| Provide multiple media and formats. | The teacher supports understanding by identifying patterns not only in text but also in the environment of the classroom, school, etc. |
| Support background context. | Teachers analyze or pre-test students for key pre-skills and background knowledge. |
| Provide ongoing, relevant feedback. | In cooperative groups, students may receive feedback from the teacher and from peers. |
| Offer choices of content and tools. | Students are assigned to one of three groups tiered by difficulty; all students are working on the same task but with varying supports. |
| Offer adjustable levels of challenge. | Varied supports in the working groups alter the level of independence and difficulty in solving the task. |

Table 3. UDL Strategies to Further Minimize Lesson Barriers in a Differentiated Instruction Lesson Plan for Mathematics.

| **Barrier** | **UDL Strategy** |
| --- | --- |
| Deducting/constructing numeric functions. | Provide different demonstrations or models  of how to use the tools employed in the lesson. Provide scaffolds and prompt students in use of number patterns. |
| Students write rules for mathematical patterns. | Provide alternative formats for students to express their interpretation of visual and representational patterns and the mathematical implications. For example, speaking, creating a diagram, numerical representations. |
| Creating number patterns. | Consider background knowledge for students entering this mathematical problem. What range of supports could  be made available to provide the informational knowledge so that students can focus on the problem-solving component? |

## Recommendations for Implementation at the Classroom Level

Although UDL applications of differentiated instruction already exist, they are   
admittedly hard to come by. Even with such models available, teachers face challenges   
in implementing them: the challenges of shifting away from traditional views of intelligence and traditional reliance on print media, the challenge of acquiring and mastering new technology, and the challenge of garnering support from the school system. The following sections offer recommendations that can help teachers overcome each one of these challenges.

Learn about Universal Design for Learning. The first and most basic step toward successfully implementing UDL is self-education. Although UDL has been more than 25 years in the making, it is an approach that challenges many traditional educational perspectives and practices. Before teachers can implement UDL effectively, they may need to learn a new perspective on students and the materials that they use in the classroom. CAST has been working to disseminate UDL widely, and, consistent with the framework itself, have developed multiple avenues (direct and indirect, self-driven and trainer-taught; through text, speech, and interactive activities) through which individuals can learn about UDL and develop the skills necessary to put it into practice.

* *Visit the* [*National Center on Universal Design for Learning*](http://www.udlcenter.org)*.* Here visitors will find an articulation of UDL, discussions of its core concepts, descriptions of UDL research projects, a listing of tools and resources that support UDL, and ideas and examples for implementing UDL.
* *Read CAST publications.* The web-based version of the book, [*Universal Design for Learning: Theory and Practice*](http://udltheorypractice.cast.org/login) provides an evolving set of resources and classroom examples, including interactive activities and an online community where visitors can ask questions and engage in discussion about UDL. Additional publications on UDL are listed in the reference section of this document.
* *Enroll in an institute or online course.* [CAST Professional Learning](http://castprofessionallearning.org/) offers many opportunities for educators, teachers, administrators, and organizations to enhance their professional understanding of [Universal Design for Learning (UDL)](http://castprofessionallearning.org/about-udl/) and the challenges of improving access to and progress and participation in the general education curriculum and how to make the curriculum accessible for all learners.
* *Talk to others.* The UDL Center web site includes [UDL Connect](http://community.udlcenter.org/), an online community where educators can communicate, collaborate, and obtain support from other educators who are exploring and teaching with UDL.
* *Integrate Technology in Education.* The National Education Technology Plan guides the use of information and communication technologies in transforming American education. UDL is referred to throughout that Plan to ensure that technology be used to optimize the diversity of learners. In an effort to model UDL, a UDL excerpt of the National Educational Technology Plan has been created. The excerpt uses pages 14 through 18 of the report to demonstrate many UDL features.

Inventory and build technology support. Technology, in particular digital media, makes UDL implementation practical and achievable in a diverse classroom. Digital materials make it possible for the same material to be flexibly presented and accessed—even adapted on a student-to-student basis.

Although we recommend that teachers try to build a library of digital materials, it is important to point out that UDL implementation can proceed successfully across a range of technology availability. The amount of technology available to teachers varies extensively—limited by district and school resources, both monetary and otherwise. Fortunately, a fairly simple step such as digitizing print materials can greatly ease UDL implementation. The 1996 United States copyright additions (Chapter 1 of Title 17 Section 121 of the United States Code), the Chafee Amendment (17 U.S.C. § 121.), gives authorized entities the freedom to digitize otherwise proprietary materials for individuals that have disabilities that impede access to the printed version. An authorized entity is a nonprofit organization or governmental agency that has a primary mission to provide specialized services relating to training, education, or adaptive reading or information access needs of blind or other persons with disabilities. This provision makes special education teachers eligible to digitize printed text materials, a step that can help to diversify the presentation of materials for students with disabilities.

Another inexpensive but instrumental option for supplying a classroom with digital materials is the World Wide Web—a tremendous source of free digital material and much of this material is in a multimedia format, which can greatly improve access to students.

Having more digital media unquestionably enables teachers to implement UDL in a more extensive way. Teachers who have greater financial resources and district support can supplement their materials with innovative products such as multimedia composition tools (e.g., HyperStudio5, Kid Pix Deluxe 3X, PowerPoint), graphic organizer software (e.g., Inspiration, Kidspiration), text-to-speech and text-to-image programs (e.g., TextHelp’s Read&Write GOLD, Kurzweil’s *firefly*, JAWS, Intellitools Classroom Suite), digital books tools (such as storyjumper, BookBuilder) and learning software (e.g., funbrain.com, Sebran’s ABC, Edmark’s various learning games).

Whether teachers are able to invest in the purchase of a lot of technology or not, UDL can proceed effectively. But taking inventory is an important step toward setting a realistic course of action. By inventorying the resources available, teachers can determine the level of technology applications of UDL implementation appropriate to their classroom. For example, survey your classroom and your school media center for a clear idea of computer and projection systems and other technology hardware available to teachers and students. Check into scheduling issues around shared equipment. Additionally, test out web accessibility in your school computer lab(s) and media center(s) as appropriate. If the web is a tool you may use and ask students to access, how available is it? Ask for or take an inventory of your school or district software, find out what’s available and if there are available licenses for computers in your classroom. Determine what filters block or limit access to some Internet sites, applications, or downloadable tools.

Effectively working with and managing technology can be a challenging process, so it is also important to assess available technology support. This may come in the form of a school or district help desk, computer teacher, computer resource specialist, technology integration teacher, etc., or one’s own technology training. Find out what policies your school or district may have regarding the tools you may adopt for use in your planning and teaching. Installation of software and hardware on computers may be time-consuming, plan for issues of timing in your installation and implementation of software and hardware. When you are ready to teach a lesson using technologies new to you or your students, consider notifying your technology support person to be at hand to help problem-solve any unforeseen challenges with implementation.

Another important step in implementation of UDL in instruction is curriculum planning and delivery. To begin, we recommend that teachers have a basic understanding of UDL and a commitment to make the curriculum and learning accessible for all learners. While keeping in mind the three principles of UDL based on the three networks—recognition, strategic and affective—we have found the following process useful in designing lessons. The process includes four steps, based upon the principles and concepts of UDL, proven professional development strategies, and effective teaching practices: (a) Set Goals, (b) Analyze Status, (c) Apply UDL, and (d) Teach the UDL Lesson.

**Figure 3: Curriculum planning and delivery.**

Set Goals: Establish Content to Align to standards; Analyze Status: Identify methods, materials, and assessment, Identify barriers; Apply UDL: Identify UDL materials and methods, Write UDL plan, Collect and organize materials; Teach UDL Lesson: Teach lesson, Evaluate success, Revise Lesson/Unit.



In the *goals setting* stage of curriculum planning, we recommend that teachers establish the context for instruction. Context is usually driven by or based on state standards, followed by the design of goals for the instructional episode. We recommend that all teachers closely evaluate these to assure alignment and to assure that the means for attaining the goals are separated from the goals and standards.

Next, when designing a UDL lesson, teachers should *analyze the current status* of the instructional episode. What are the current methodologies, assessments, and materials used to teach the lesson? Analyze these teaching procedures in relation to potential barriers of learners in the classroom. Do all students have access to the materials? Are students able to express themselves with the current methods and materials? There are a number of resources and tools available from CAST to analyze, build, and share resources, lessons, and collections in [UDL Exchange](http://udlexchange.cast.org/home) to support instruction guided by UDL principles.

The third recommended step of the planning process is to *apply UDL to the lesson or unit.* This includes the goals, methods, assessments, and materials used to implement the lesson. Create the UDL lesson plan, grounded in the learning goals, classroom profile, methods and assessment, and materials and tools. Then, collect and organize materials that support the UDL lesson.

In the final step, *teaching the UDL lesson or unit*, minimize barriers and realize the strengths and challenges each student brings to learning, rely on effective teaching practices, and apply challenges appropriate for each learner. In this way, instructors can engage more students and help all students progress. When teaching and evaluating students’ work, also evaluate and revise the lesson or unit to assure student access and success. You may obtain additional information about designing UDL methods, assessments, and materials in [*UDL Theory and Practice*](http://udltheorypractice.cast.org/), Chapter 6.

Secure administrative support.School districts and administrations can be powerful sources of support—financial and otherwise. Administrative commitment to UDL can strengthen a teacher’s sense of mission and self-satisfaction and lead to important funding. A case in point is the town of Gloucester, Massachusetts. The principal for the school system is so convinced of the importance of digitized materials that he has set a mandate that teachers use only those textbooks that have a digitized version. Teachers will use a text-to-speech reader to further improve the accessibility of the text. Clearly, this kind of change would have happened much more slowly in the absence of such tremendous administrator-level support.

Administrator support can also help to facilitate funding, which although not a prerequisite for UDL, can create important opportunities. Funding might enable the purchase of equipment, professional development, and the launching of new UDL teaching projects. Districts vary widely concerning the types and level of funding that they offer teachers, but teachers who can convince their administrators of the value of UDL may be able to secure district-level grants, professional development awards, and sabbaticals. For example, in a North Shore Massachusetts school district, the Technology Program Manager and Special Education Director teamed with two teachers using UDL and were awarded a state-level technology grant to implement UDL. This is just one example of how support at the administrative level can facilitate the acquisition of materials that support UDL efforts in the classroom.

Parent education and involvement.Parents are another valuable resource for teachers building a UDL curriculum. There are at least two important ways that parents can be a resource: as advocates and as volunteers.

By educating parents about the UDL activities going on in the classroom, teachers can develop a support system of informed individuals who can assist with and advocate for UDL instruction. Teachers should think about ways to inform parents about classroom activities. Notes sent home, parent night presentations, and IEP meetings are all excellent opportunities to engage in this kind of communication. Once parents are educated about UDL they may wish to become involved themselves. There are many ways that parents can do this, including volunteering in the classroom and lending support at home. A few possibilities are helping to prepare materials, monitoring kids during UDL lessons, helping with technology, donating equipment, and supporting homework assignments.

## Conclusion

Differentiated instruction, like UDL, has been developing in educational settings over the past 20 years. They have both received significant recognition. When differentiation is combined with the practices and principles of UDL, it can provide teachers with both theory and practice to appropriately challenge the broad scope of students in classrooms today. Although educators are continually challenged by the ever-changing classroom profile of students, resources, and reforms, practices continue to evolve and the relevant research base should grow. And along with them grows the promise of differentiated instruction and UDL in educational practices.

## Links to Learn More About Differentiated Instruction

[**Association for Supervision and Curriculum Development (ASCD) Web Site**](http://www.ascd.org/research-a-topic/differentiated-instruction-resources.aspx)A site by ASCD (2014) which discusses differentiated instruction. Links to other pages with examples from elementary through high school, key characteristics of a differentiated classroom, benefits, related readings, discussion, and related links to explore.

[**Carol Tomlinson Web Site**](http://www.caroltomlinson.com/)This web site includes presentations, books, articles, and other resources about differentiated instruction which responds to the needs of all learners through active planning for student differences in classrooms.

[**Differentiation Central**](http://www.diffcentral.com/)This web site is designed to help educators understand the principles of differentiated instruction while developing competence in creating responsive classrooms that meet the diverse learning needs of students. The site includes information on institutes related to professional development and links to lesson plans, tools, strategies, books, articles, and video clips.

**Guild, P. B. & Garger, S. (1998).** [**What Is Differentiated Instruction? Marching to Different Drummers**](http://www.ascd.org/publications/books/198186.aspx)Initially published in 1985, *Marching to Different Drummers* was one of the first sources to pull together information on what was a newly-flourishing topic in education. Part I defines style and looks at the history of style research; Part II describes applications of style in seven areas; Part III identifies common questions and discusses implementation and staff development.

**Hess, M. A.** [**Although Some Voice Doubts, Advocates Say Differentiated Instruction Can Raise the Bar for All Learners**](http://weac.org/articles/differ/)**. NEA Communications.**This web site provides research materials, access to classroom resources, news, articles, background on education materials, and social networking opportunities. The specific article linked here discusses reasons why advocates believe that differentiated instruction can raise the bar for all learners.

[**Preparing Teachers for Differentiated Instruction**](http://www.ascd.org/publications/educational-leadership/sept00/vol58/num01/-Preparing-Teachers-for-Differentiated-Instruction.aspx)This page provided by *Educational Leadership* magazine links the reader to a brief summary of an article by Holloway. The author has provided a bulleted summary regarding the principles and theories that drive differentiated instruction.

[**Reading Rockets Webcast**](http://www.readingrockets.org/webcasts/1001)This webcast on the Reading Rockets web site outlines the most effective strategies teachers can use to address the many different needs of each of their students. The site also includes recommended resources and discussion questions for follow-up.

[**Scholastic Teaching Resources Web Site**](http://www.scholastic.com/teachers/article/what-differentiated-instruction)This web site includes an article excerpted from *Differentiating Reading Instruction*, by Laura Robb. The article includes a list of key principles that form the foundation of differentiating instruction and nine practices to differentiate reading instruction. The site includes links to suggested reading related to differentiation.

[**Study.com Tutorial**](http://study.com/academy/lesson/what-is-differentiated-instruction-examples-definition-activities.html#lesson)This web site includes a lesson on differentiated instruction and information on how teachers take student differences into account and modify their instruction to meet the needs of all students. This site includes examples, definitions, and activities and provides related videos.

[**Teach-nology Web Site**](http://www.teach-nology.com/litined/dif_instruction/)This web site is designed for educators and uses technology to inform teachers about current practices, literature, the law in education, as well as professional development. Additionally, links to articles including research on educational practices with links to information on differentiated instruction are included.

**Tomlinson, C. A. (1995).** [**Differentiating instruction for advanced learners in the mixed-ability middle school classroom. ERIC Digest**](http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED389141)The ability to differentiate instruction for middle school-aged learners is a challenge. Responding to the diverse students needs found in inclusive, mixed-ability classrooms is particularly difficult. This digest provides an overview of some key principles for differentiating instruction, with an emphasis on the learning needs of academically advanced students.

**Tomlinson, C. A. (1999.)** [**Mapping a route toward differentiated instruction. *Educational Leadership***](http://www.ascd.org/publications/educational-leadership/sept99/vol57/num01/Mapping-a-Route-Toward-Differentiated-Instruction.aspx)***, 57*(1).**Carol Ann Tomlinson is an Associate Professor of Educational Leadership, Foundations and Policy, at the Curry School of Education, University of Virginia, Charlottesville, VA.

**Tomlinson, C. A. (2000).** [**Differentiation of instruction in the elementary grades. ERIC Digest**](http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED443572)To meet the needs of diverse student populations, many teachers differentiate instruction. This digest describes differentiated instruction, discusses the reasons for differentiated instruction including what makes it successful, and suggests how teachers may begin implementation.

**Tomlinson, C. A. & Allan, S. D. (2000).** [**Leadership for differentiating schools and classrooms**](http://www.ascd.org/publications/books/100216.aspx)**. Association for Supervision and Curriculum Development. ASCD.**This web site contains two chapters from Tomlinson’s recent publication: *Leadership for differentiating schools and classrooms*, published by the Association for Supervision and Curriculum Development. This book is designed for those in leadership positions to learn about differentiated instruction.

**Willis, S. & Mann, L. (2000).** [**Differentiating instruction: Finding manageable ways to meet individual needs**](http://www.ascd.org/publications/curriculum-update/winter2000/Differentiating-Instruction.aspx) **(*excerpt*). Curriculum Update.**Based on the concept that “one size does not fit all” the authors describe the teaching philosophy of differentiated instruction. More teachers are determined to reach all learners: to challenge students who may be identified as gifted as well as students who lag behind grade level. This article excerpt describes the essential components of differentiated instruction beginning with three aspects of curriculum: content, process, and products.

**Willoughby, J. (2005.)** [**Differentiated Instruction: Meeting Students Where They Are**](http://www.glencoe.com/sec/teachingtoday/subject/di_meeting.phtml)**. Teaching Today.**Teachers can lay the foundation for differentiated instruction by getting to know their students, identifying areas of the curriculum that could be adapted to differentiate instruction, and examining their role as a teacher in the differentiated classroom. The site offers strategies for successfully implementing differentiated instruction and what it means for teachers.

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