

Ready Classroom Mathematics

Universal Design for Learning

The following content provides an overview of Universal Design for Learning (UDL) concepts and highlights findings from a third-party UDL analysis that demonstrate how *Ready Classroom Mathematics* embodies principles of UDL.

Overview

What is UDL?

[Universal Design for Learning \(UDL\)](#) is a framework for improving and optimizing teaching and learning for all people based on scientific insights into the diverse ways in which humans learn. The framework first laid out in the 1990's by David Rose and Anne Meyer at [CAST](#), has the goal of supporting students in becoming “expert learners” who are purposeful and motivated, resourceful and knowledgeable, and strategic and goal driven.¹

Does *Ready Classroom Mathematics* Embody UDL Principles?

Ready Classroom Mathematics embraces the three key UDL principles of providing multiple means of engagement, representation, and action & expression. As it continues to expand its use of digital technology interfaces, it will further address specific UDL guidelines, such as providing options for perception and physical action.

UDL Principle and Guideline-specific Alignment

Principle: Provide multiple means of engagement

UDL states that in order to support students' *diverse affective networks*, curricula and instructional materials must provide students *multiple means of engagement*. This aspect of UDL is particularly challenging to implement, and this is where *Ready Classroom Mathematics* shines. It provides a plethora of student-direct and teacher-mediated supports that provide *options for recruiting interest, sustaining effort and persistence, and self-regulation*.

Guideline: Provide options for recruiting interest

- The Try-Discuss-Connect discourse-based instructional routine encourages students to engage collaboratively in productive struggle as an opportunity for self-discovery. It also provides teachers opportunity to observe and communicate appropriate strategies and supports. During Try It, students choose problem solving strategies and tools, and receive feedback on the appropriateness of their choices during Discuss It. During Connect It, teachers are encouraged to choose students representing diverse abilities and perspectives to model problem solving strategies. Throughout the process, students are encouraged to clarify their understanding, and any confusion or misconceptions.

¹CAST. (2020). About Universal Design for Learning. Retrieved from <http://www.cast.org/impact/universal-design-for-learning-udl>

- Students choose which learning games to play and when to support their learning and self-manage their engagement. They can also choose the context of games (e.g., focus on addition vs. subtraction skills) and the level of challenge (e.g., single vs. two digit number, and whether the game is timed).
- *Ready Classroom Mathematics* contains a wide range of instructionally embedded math problems and activities that provide meaningful opportunities for students to engage. Many of these provide authentic contexts that allow students to connect math with their life experiences. Pure math problems are also provided, which helps students for whom problem contextualization may be overly challenging.
- Connect to Community and Community Responsiveness guidance for teachers provide culturally and linguistically responsive suggestions to improve lesson authenticity and relevance vis-à-vis students' diverse backgrounds and experiences.
- The Family Resource Center provides at-home learning and engagement supports, and the Connect to Family guidance supports teachers in encouraging families to provide learning supports. For many students, these will provide be a safer, more familiar, and/or less distracting environment in which to engage in challenging learning topics.
- Digital learning games, such as *Play Pizza!* and *Play Cupcake!*, provide authentic scenarios in which students apply their mathematical skills.

Guideline: Provide options for sustaining effort and persistence

- The *Ready Classroom Mathematics* pedagogical approach overall establishes clear sets of goals at the session, lesson, and unit levels.
- Teachers are guided in providing feedback that "encourages perseverance, focuses on development of efficacy and self-awareness, and encourages the use of specific supports and strategies in the face of challenge" and to develop the habits of mind highlighted in the Mathematical Practice Standards.
- Small group differentiation provided both in the Teacher's Guide and the Teacher Toolbox allow for continued opportunities for sustained effort and persistence. Targeted activities are provided for different needs to help reteach, reinforce, or extend learning as needed.
- Hand-On Activities provide alternative opportunities for students to engage in lesson concepts.
- Interactive Tutorials provide graduated supports as a function of student responses, including correct answers to keep student moving through larger problems.
- Learning game challenge levels are differentiated for students, and students are further permitted to adjust challenge levels.

Guideline: Provide options for self-regulation

- Try It and Connect It provide explicit opportunity for students to clarify what is expected of them and any confusions about their learning process.
- Connect It encourages teachers to choose a range of learners to demonstrate problem solving strategies, including students with less proficiency (e.g., with vocabulary), thus providing more accessible and relatable models for other students.

- End-of-unit Self Reflection tasks review skills covered in the unit and encourage students to consider their learning experience metacognitively.

Principle: Provide multiple means of representation

UDL states that in order to support students' *diverse recognition networks*, curricula and instructional materials must provide students *multiple means of representation*. *Ready Classroom Mathematics* accomplishes this through various *options for language & symbols and for comprehension*.

Guideline: Provide options for comprehension

- Central to the *Ready Classroom Mathematics* pedagogical approach is clarifying and explaining mathematical syntactical and structural relationships to promote not only students' understanding of content but their opportunities to engage with and learn from it. All materials, including whole class, student worktext, and learning games, make extensive use of multiple representations of mathematical concepts, structures, operations, and syntaxes to explain elements of meaning. The Interactive Tutorials further provide animation and auditory representations.
- Students are provided with varying conceptual access paths so they can understand the details of particular representations and problem-solving approaches within a broader context of mathematical understanding. A key way this is accomplished is by encouraging students during Try It to experiment with concrete, representational, and abstract strategies to support effective understanding, problem solving, and communication.
- Application of acquired mathematical knowledge and skills is encouraged through high degrees of embedded review and practice, consistent use of multiple representations, and dialoguing to improve memorability.
- Multimedia are leveraged heavily across *Ready Classroom Mathematics*. Interactive Tutorials make extensive use of video-based multimedia to provide social, language-based modeling of problem solving, Learning games and digital tools leverage multimedia to provide expanded representation of mathematical concepts.
- The digital student worktext available on the *Ready Classroom Mathematics* student bookshelf provides students with options for perception, including built-in magnification, text-to-speech and screen reader support.
- Unit-level Literacy Connections provide explicit cross-curricular connections.
- Interactive tutorials provide examples and non-examples of critical features of problems.
- Interactive Tutorials provide explicit prompts, organizational methods, and interactive models on problem solving approaches.
- Learning games provide hints, scaffolds, and feedback to support students in making meaning of math representations and concepts.

Guideline: Provide options for language and symbols

- *Ready Classroom Mathematics* provides extensive vocabulary supports for students as part of its core pedagogy. For example, vocabulary-building graphic organizers at the end of Explore sessions provide an alternative, interactive way for students to make meaning from and use math terminology.
- Classroom practices especially Try-Discuss-Connect, provide students with verbal representations and thus scaffold mathematical notation and symbol decoding.
- Flexible support for English language learners is provided in a number of ways:
 - Differentiated instructional routines specifically targeting English-language learners provide leveled instruction and scaffolds for listening, speaking, reading, and writing skills.
 - Multilingual Glossaries provide English-language learners definitions of key terminology, and embed visual, non-linguistic supports for vocabulary clarification.
 - Spanish language version of materials provides alternative for Spanish-speaking students with limited English proficiency.

Principle: Provide multiple means of action & expression

UDL states that in order to support students' *diverse strategic networks*, curricula and instructional materials must provide students *multiple means of action and expression*. *Ready Classroom Mathematics* accomplishes this through various *options for executive functions and expression & communication*. As *Ready Classroom Mathematics* expands its digital technology tools, it will also provide students with additional *options for expression & communication*.

Guideline: Provide options for expression and communication

- Allowing students to decide whether concrete, representational, or abstract strategies are most appropriate during Try It provides them the productive struggle needed to learn to select tools that are an optimal match between their abilities and the demands of the task.
- The printed worktext allows students to respond to constructed response items using a range of physical drawing tools, such as rulers, compasses, and protractors.
- Physical math toolkit components (e.g., counters, unit tiles, hundred charts, number lines, and index cards) and Virtual tools (e.g., Fraction Models, Multiplication Models, Number Line, Base-Ten Blocks, and Perimeter and Area Tool) provide additional opportunities for students to interact and demonstrate their knowledge and skills.
- The Mathematical Language Reference Tool provides sentence starters to scaffold students in the writing process.
- The digital student worktext available on the *Ready Classroom Mathematics* student bookshelf provides students with options for physical action by allowing for alternate means of navigation, such as via keyboard, and optimizing for access to tools and assistive technologies.

Guideline: Provide options for executive functions

- Try It encourages students to experiment with concrete, representational, or abstract strategies, promoting a philosophy that there is no one "right way" for them plan and execute their own strategies and tool use. Furthermore, by promoting productive struggle and perseverance, students are provided opportunity to learn how to set goals for the amount of independent effort before requesting support.
- Whole class instruction, differentiated instruction, digital tools, and Interactive Tutorials provide students with a range of explicit supports and scaffolds for organization and working memory. Students are also encouraged to provide supports and scaffolds for each other.
- Embedded within *Ready Classroom Mathematics* are different formal and informal assessments that can provide means for students to identify opportunities for skill acquisition and monitor their progress, including session exit tickets, lesson quizzes, unit assessments, and unit self-checks.
- Learning games offer tools for students to build working memory.
- Student dashboard provides students with results from Comprehension Checks and allows them to monitor their performance over time.