Math & Reading Accessibility Framework

Use these guiding principles for planning and implementing accessible instruction and support.

1. **Collaborate** with colleagues to share expertise, plan, problem solve and reflect on experiences.
2. **Find out** about students' strengths and difficulties by examining student work and using questioning & assessment strategies.
3. **Identify** instructional goals, lesson demands, and priorities for student learning.
4. **Align strategies** with students' strengths, needs and instructional goals, taking care to maintain the integrity of the content. **Build on** students' strengths.
5. **Plan** for a continuum of learners. **Differentiate** instructions to meet the varied needs, strengths, and interests of your students.
6. **Be proactive** by anticipating barriers and planning strategies to use as needed. **Be flexible** about changing plans and strategies to meet unanticipated needs.
7. **Make accommodations** to lessons and assessments so that students can show what they know without being impeded by disabilities.
8. **Provide support** but also **promote student independence** and self-advocacy.
9. **Gather evidence** of the effectiveness of strategies and **reflect** on strategies tried.
10. **Create a supportive classroom culture** that is respectful of learner differences and that allows students to feel comfortable taking risks.

Math Accessibility References:

Accessibility framework developed by: Education Development Center, Inc (EDC) in Waltham, MA with support from The National Science Foundation Grant No. ESI-9911831. For more information go to: www.edc.org/accessmath

Reading Accessibility References:

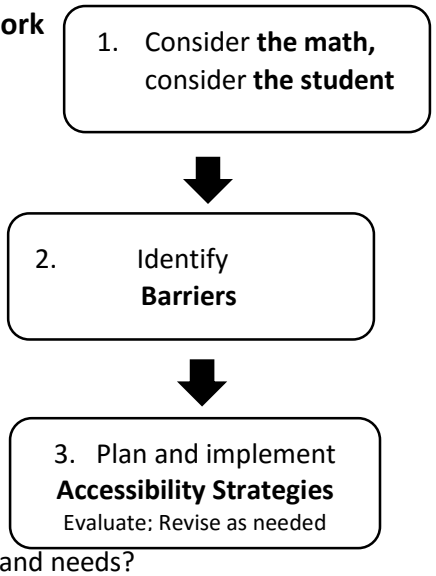
Honig, B., Diamond, L., & Gutlohn, L. (2008). *Teaching Reading Sourcebook*. Novato, CA: Arena Press.

Reid, R., Lienemann, T., & Hagaman, J. (2013). *Strategy Instruction for Students with Learning Disabilities.* New York, NY. The Guildford Press.

A. What's Involved in Learning Mathematics?

Learning Area	Demands: Tasks that Students Need to Carry Out in Learning Mathematics	Student Difficulties
Conceptual	• Moving from the concrete to the abstract • Making generalizations and connections • Meta-cognitive, such as reflecting on thinking and self-questioning	• Thinks concretely and has difficulty generalizing
Language	• Reading Text • Writing explanations • Understanding and using math vocabulary	• Difficulty understanding written directions
Visual-Spatial	• Aligning numbers • Working with 2-d and 3-d representations • Copying from board and book	• Difficulty interpreting coordinate graphs
Organization	• Collecting and recording data • Sequencing multi-step procedures • Finding information in prior student work	• Disorganized approach to problems lead to errors
Memory	• Recalling from previous information from long term memory, such as math facts • Keeping pieces of information in one's head (working memory) to solve multi-step problems • Remembering steps in a procedure	• Makes frequent errors when retrieving information
Attention	• Sustaining attention to carry out multi-step problems • Focusing on the details in math problems • Sitting for extended periods	• Speeds through tasks and makes many careless errors
Other	• Using fine motor skills for making tables, graphs, diagrams, etc. • Using social skills for working cooperatively with classmates in pairs or groups • Working independently and moving though a frustration point.	• Works very slowly and with difficulty on tasks that involve fine motor skills

B. Math Accessibility Framework



Math

- Unit Goals
- IEP Goals
- What are the math goals for student learning?
- What are the task demands for students?

Students

- What are the students' strengths and difficulties as math learners?
- What is their prior knowledge of the math?

Barriers

- Where does the math lesson match or not match the students' strengths and needs?
- What kinds of difficulties do you anticipate for students?

Accessibility Strategies

Plan

- What kind of strategies would be a good match to the math *goals* and students' strength and needs?

Implement

- How will you implement the strategy?
    - Will you use the strategy from the start or keep it in your 'back pocket'?
    - Which students will you use it with? All? Some? A few? None?
- If there are two teachers, what roles will each one play in implementing this strategy?
- How will you gather evidence to see if the strategy is helpful for student learning?

Evaluate and Revise

- What happened when you implemented the strategy?
- Based on the evidence you collected, how helpful was the strategy for students? Why?
- What might you do differently in the future?

Check points for Accessibility Strategies

Do the strategies

- ✓ Closely align with the math goals *and* the students' strengths and needs?
- ✓ Maintain the integrity of the mathematics?
- ✓ Help students to build understanding of the mathematics?
- ✓ Help students to become more independent learners?

C. Mathematics Accessibility Strategies to Consider

Helping Students Understand Tasks

- Reword directions or questions
- Have students paraphrase directions and questions
- Provide visual *and* auditory directions
- Preview vocabulary
- Have students highlight key information
- Change context to make it more familiar or appealing to students
- Show examples of the finished product

Helping Students Access Math in Varied Ways

- Build on students' prior math knowledge
- Make connections across math topics
- Move from concrete to representational to abstract
- Use multiple representations
- Provide additional examples
- Offer manipulatives
- Use technology strategies
- Use visuals like charts or projected images
- Offer alternative ways for students to show what they know
- Provide kinesthetic learning opportunities

Building Student Independence

- Offer timers to help students with pacing
- Teach highlighting and color-coding
- Use "think-alouds" and other metacognitive strategies
- Teach *and* model strategies for:
    - Organization
    - Self-questioning and self-monitoring
    - Problem-solving
    - Memory (such as mnemonics)
- Clarify expectations (use rubrics)

Providing Tools and Handouts

- Provide study guides with key information to reduce copying and note taking
- Offer calculators and multiplication charts
- Provide resource sheets
- Provide templates for tables, graphs, writing, and other tasks
- Use graphic organizers
- Provide practice problems
- Provide a word bank with key vocabulary words and visuals

Promoting Understanding though Discourse

- Have students work in pairs or small groups
- Use cooperative learning
- Keep class discussions short and focused
- Provide timely and constructive feedback
- Check in frequently with students
- Use questions, prompts, and hints

Helping Students Manage Tasks and Organization

- Reformat handouts to provide more workspace
- Reduce amount of copying
- Provide a checklist
- Provide time management cues
- Set up a notebook organizational system
- Provide project organizers to help the students keep track of tasks
- Offer tools such as highlighters and post-its to help students focus

Adjusting Tasks to Student Needs

- Adjust level of difficulty
- Use friendlier numbers
- Break complex tasks into smaller parts
- Adjust amount of time for tasks
- Adjust amount of work
- Create multiple versions of a problem, in order to offer alternatives to a range of learners
- Adjust pacing to optimize attention

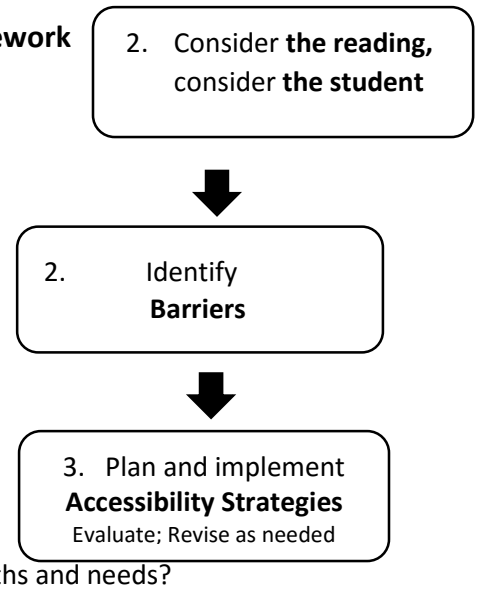
Create a Supportive Learning Environment

- Post and reinforce classroom expectations
- Post homework assignments in a consistent location
- Seat students strategically, based on needs like vision or hearing. Seat distractible students away from windows and doors
- Use nonverbal signals to cue attention or behavior
- Use consistent and familiar routines
- Provide easy access to manipulatives, templates, and other tools in the classroom

D. What's Involved in Learning to Read?

Learning Area	Demands: Tasks that Students Need to Carry Out in Learning to Read	Student Difficulties
Conceptual	• Moving from the concrete to the abstract (e.g.-making predictions, inferences) • Making generalizations and connections • Using meta-cognitive strategies, such as reflecting on thinking and self-questioning • Extrapolating meaning from text • Utilizing parts of a book (index, table of contents, etc.)	• Thinks concretely and has difficulty generalizing/interpreting text
Language	• Reading text • Providing explanations of text • Understanding & using vocabulary • Discriminating, manipulating, & deleting phonemes • Blending sounds into words • Using context clues, roots, prefixes, and suffixes to decode words.	• Difficulty understanding written directions • Difficulty comprehending text passages read • Limited vocabulary & background knowledge • Low utility of vocabulary usage
Visual-Spatial	• Tracking words in print (left to right & top to bottom) • Naming, discriminating graphemes & connecting with appropriate sounds • Understanding text structure, graphics/illustrations in a passage to support constructing meaning • Copying from board and book • Using a graphic organizer to represent text information • Reading high-frequency words fluently	• Difficulty identifying letters, sounds, & isolating sounds in words • Difficulty discriminating, manipulating, & blending sounds together. • Difficulty interpreting graphics/illustrations in text • Inaccurate copying
Organization	• Finding, collecting and recording information from text • Organizing & sequencing the passage • Locating information back in the text	• Disorganized approach to metacognition • Unable to accurately represent events in a text • Unable to categorize and organize thinking
Memory	• Recalling from previous information from long term memory, such as background knowledge/vocabulary • Keeping pieces of information in one's head (working memory) to decode and/or comprehend text • Remembering steps in a procedure • Recognizing common word patterns & recurring word parts • Reading at a rate which creates meaning while reading • Reading fluently with prosody (expression)	• Makes frequent errors when retrieving information • Errors in reading fluency • Difficulty focusing on multiple tasks (e.g.-decoding & comprehension) • Difficulty determining main idea and extrapolating meaning from text. • Lack of sight word vocabulary
Attention	• Sustaining attention to read entire passage • Sustaining attention to decode and then remember/comprehend text • Focusing on the details/structures in a text • Sitting for extended periods	• Speeds through tasks and makes many careless errors • Errors in decoding and interpreting text
Other	• Using fine motor skills to track print, make letters, handle books turning pages • Using social skills for working cooperatively with classmates in pairs or groups • Working independently and moving though a frustration point.	• Works very slowly and with difficulty on tasks that involve fine motor skills

E. Reading Accessibility Framework



Reading

- Unit Goals
- IEP Goals
- What are the reading goals for student learning?
- What are the task demands for students?

Students

- What are the students' strengths and difficulties as reading learners?
- What is their prior knowledge of the text?

Barriers

- Where does the reading lesson match or not match the students' strengths and needs?
- What kinds of difficulties do you anticipate for students?

Accessibility Strategies

Plan

- What kind of strategies would be a good match to the reading *goals* and students' strength and needs?

Implement

- How will you implement the strategy?
    - Will you use the strategy from the start or keep it in your 'back pocket'?
    - Which students will you use it with? All? Some? A few? None?
- If there are two teachers, what roles will each one play in implementing this strategy?
- How will you gather evidence to see if the strategy is helpful for student learning?

Evaluate and Revise

- What happened when you implemented the strategy?
- Based on the evidence you collected, how helpful was the strategy for students? Why?
- What might you do differently in the future?

Check points for Accessibility Strategies

Do the strategies

- ✓ Closely align with the reading goals *and* the students' strengths and needs?
- ✓ Maintain the integrity of the reading? Text instruction?
- ✓ Help students to build understanding of the text/reading?
- ✓ Help students to become more independent learners?

F. Reading Accessibility Strategies to Consider

Helping Students Understand Tasks

- Reword directions or questions
- Have students paraphrase directions and questions
- Provide visual *and* auditory directions
- Preview vocabulary & background knowledge
- Have students highlight key information
- Change context to make it more familiar or appealing to students
- Use instructional routines consistently to teach decoding, comprehension strategies, & vocabulary
- Show examples of the finished product
- Model reading fluently & using comprehension strategies prior to student use

Helping Students Access Reading in Varied Ways

- Build on students' prior reading/content knowledge
- Make text connections (text-world, text-text, text-self)
- Move from literal to inferential questions
- Provide multiple opportunities to reread
- Use technology supports such as: One Click Answer, Free Natural Readers, Read Me, Built in Text to Speech on IPad
- Use visuals like charts or projected images
- Offer alternative ways for students to show what they know
- Provide kinesthetic learning opportunities such as: letter tiles, blending mats, pocket charts,
- Use Oral-Cloze procedure during group read aloud

Building Student Independence

- Offer timers to help students with pacing
- Teach highlighting & color-coding
- Use "think-alouds" and other metacognitive strategies
- Teach *and* model strategies for:
    - Organization
    - Self-questioning and self-monitoring
    - Problem-solving
    - Memory (such as mnemonics)
- Clarify expectations (use rubrics)
- Utilize comprehension bookmarks that include Sentence Starters and Cloze Sentences to support practice of comprehension strategies

Providing Tools and Handouts

- Allow students to use tracking devices (e.g.-finger, transparent yellow tracking card, index card)
- Provide study guides with key information to reduce copying and note taking
- Provide resource sheets
- Use graphic organizers
- Provide a word bank with key vocabulary words and visuals

Promoting Understanding though Discourse

- Have students work in pairs or small groups
- Use cooperative learning
- Keep class discussions short and focused
- Provide timely and constructive feedback
- Check in frequently with students
- Use questions, prompts (e.g.- sentence starters), and hints
- Use 'Think-Pair-Share' routine to support reading comprehension
- Utilize Sentence Starters for comprehension questions

Helping Students Manage Tasks and Organization

- Reformat handouts to provide more workspace
- Reduce amount of copying
- Provide a checklist
- Provide time management cues
- Set up a notebook organizational system
- Provide project organizers to help the students keep track of tasks
- Offer tools such as highlighters and post-its to help students focus

Adjusting Tasks to Student Needs

- Adjust level of difficulty
- Break complex tasks into smaller parts
- Adjust amount of time for tasks
- Adjust amount of work
- Adjust pacing to optimize attention

Create a Supportive Learning Environment

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- Use nonverbal signals to cue attention or behavior
- Use consistent and familiar routines
- Provide easy access to manipulatives, templates, and other tools in the classroom