Nebraska Math Instructional Shifts, Practices, and Materials

NEBRASKA INSTRUCTIONAL MATERIALS COLLABORATIVE

Because materials matter for all Nebraska students.

Academic standards provide a framework for ensuring quality teaching and learning. Recent revisions and updates to Nebraska content standards, per Nebraska Revised Statute 79-760.01, require a number of key shifts that are essential to fulfill the vision of Nebraska's College and Career Readiness (CCR) Standards for English Language Arts, Mathematics, and Science. These shifts require thoughtful changes in instruction.

For K-12 mathematics instruction in Nebraska, the shifts are: focus on fewer concepts, understand mathematics through coherence, and experience rigorous mathematical content. The ability to focus on fewer concepts creates time within each grade level to go into depth on concepts, and more time for conceptual understanding supports development of procedural skills and fluency. Mathematical concepts are coherently connected within and across grade levels, and the mathematical processes help students to understand mathematics through coherence. In order to experience rigorous mathematical content, instruction should offer students opportunities to explain why concepts work, demonstrate relationships between concepts, and apply mathematics to real-world situations.

Using the instructional shifts as a basis, this document was created by a committee of Nebraska educators to assist teachers, schools, and districts in establishing connections between the content and process standards for mathematics, teaching practices from the National Council of Teachers of Mathematics, and what instructional materials should include to support teachers and students.

Nebraska's College and Career Ready Standards for Mathematics	NCTM Teaching Practice	What do you look for in materials?	More of this...	Less of this...
NE Content Standards	- Establish mathematics goals to focus learning.	- Support for understanding and developing the big ideas across the grade level/ course	- Content AND process standards identified throughout the	- Lessons and/or chapters without alignment to content and process standards

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		that are aligned to NE standards	materials	
NE Process Standards				
1. Solves mathematical problems. Through the use of appropriate academic and technical tools, students will make sense of mathematical problems and persevere in solving them. Students will draw upon their prior knowledge in order to employ critical thinking skills, reasoning skills, creativity, and innovative ability. Additionally, students will compute accurately and determine the reasonableness of solutions.	- Implement tasks that promote reasoning and problem solving. - Support productive struggle in learning mathematics. - Build procedural fluency from conceptual understanding.	- Group-worthy tasks/problems that are "low floor - high ceiling"	- Problems and exercises with multiple solution paths - Problems and exercises with multiple solutions - Problems and exercises that are non-routine - Tasks that promote the use of the modeling process	- Leading students through processes step by step - Word problems that follow prescribed solution methods
2. Models and represents mathematical problems. Students will analyze relationships in order to create mathematical models given a real-world situation or scenario. Conversely, students will describe situations or scenarios given a	- Use and connect mathematical representations. - Implement tasks that promote reasoning and problem solving.	- Explicit opportunities for students to engage in mathematical modeling given real-world situations - Authentic data or ways to access authentic data for the explanation of	- More exercises with authentic context - More problems that promote reading - Problems and exercises that promote the use of multiple	- Fewer exercises without context - Problems and exercises that expect the use of a specific representations (equation, graph, table, etc.)

		mathematical models. - Connections between models and explanations and vice versa.	representations	
3. Communicates mathematical ideas effectively. Students will communicate mathematical ideas effectively and precisely. Students will critique the reasoning of others as well as provide mathematical justifications. Students will utilize appropriate communication approaches individually and collectively and through multiple methods, including writing, speaking, and listening.	- Facilitate meaningful mathematical discourse. - Pose purposeful questions. - Elicit and use evidence of student thinking.	- Explicit support for teaching in various participation structures (i.e., individual, small-group, whole-group) - Tasks and questions for students that require mathematical justification and critiquing the reasoning of others - Support for teachers in anticipating, interpreting, and using the reasoning of students	- Questions with multiple answers - Questions that promote reasoning and critical thinking - Questions that promote critiquing others' ideas/work	- Questions that funnel students to a particular answer - Questions with a single answer (right/wrong) - Questions that do not require an explanation
4. Makes mathematical connections. Students will connect mathematical knowledge, ideas, and skills beyond the math classroom. This includes the connection of	- Use and connect mathematical representations. - Build procedural fluency from conceptual understanding	- Concept trajectories are visible and support is provided for making connections (e.g., rate of change, functions)	- Lessons that address multiple content and process standards at once	- Lessons that are aligned to single, content standards - Lessons that address concepts and skills from

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mathematical ideas to other topics within mathematics and to other content areas. Additionally, students will be able to describe the connection of mathematical knowledge and skills to their career interest as well as within authentic/real-world contexts.		- Tasks/problems that require students to use mathematical skills or concepts to answer authentic problems	- Lessons and Chapters that refer to concepts and skills learned in prior or future grades/courses	prior grades/courses as if they are new to students - Lessons that do not address how current concepts and skills will be used in future grades/courses