

**Utah State Board of Education**  
**Elementary Mathematics Endorsement Course Framework**  
**Mathematics for Teaching K-8 - Assessment and Intervention**

**Course Description:** To provide practicing teachers a deeper understanding of the various types of assessment and their appropriate use for guiding instruction, intervention, and evaluation of student learning of mathematics content. Teachers will learn to screen students for mathematics problems or potential mathematics problems, diagnose students' mathematics strengths and needs, and monitor students' progress to ensure students will make optimal progress in mathematics. Teachers will also learn procedures for managing and analyzing assessment data.

**Course Objectives:**

During this course students will:

- Distinguish between formative and summative assessment, create and use these two forms of assessment.
- Understand the purpose of common assessments; design and implement common assessment in collaborative teams to improve student success in mathematics.
- Understand and use the following types of tasks: open, closed, and performance.
- Understand, create, and use authentic assessments.
- Be able to select appropriate assessments to meet diagnostic needs.
- Demonstrate knowledge of children's mathematical development according to the content strand.
- Understand, create, and use assessment rubrics.
- Understand and avoid the influence of bias in assessment.
- Provide multiple and flexible methods of presentation, expression, and options for engagement.
- Provide multiple and flexible methods of intervention.
- Understand and use differentiated and brain compatible learning strategies in mathematics instruction.

**Topics:**

**Purposes and Types of Assessments**

- Formative assessments and learning progressions
- Summative assessments
- Assessment techniques
- Open, closed, and performance tasks
- Criterion and norm referenced tests

**Effective Formative Assessments**

- Selecting appropriate assessments for diagnosis
- Designing tasks for formative evaluation

**Universal Design for Learning**

- Support recognition learning by providing multiple and flexible methods of presentation
- Support strategic learning through multiple and flexible methods of expression and apprenticeship
- Support affective learning through multiple and flexible options for engagement.

## **Analysis of Student Work**

## **Creating Performance Tasks**

## **Creating and Using Assessment Rubrics**

## **Creating Quality Summative Classroom Assessments**

## **Creating and Using Common Assessments**

- Understand the purpose of common assessments.
- Design and implement common assessment in collaborative teams to improve student success in mathematics.

## **Understanding Statistics**

- Measures of Central Tendency.
- Measures of Spread.
- Bias.
- Reliability and validity.

## **Issues in Assessment**

- Learning vs. auditing.
- Value added vs. absolute standards.
- Traditional assessment vs. alternative assessments.
- Authentic vs. contrived.
- Speed tests vs. power tests.

## **Using Assessment for Intervention**

- The ongoing nature of assessment.
- Diagnostic assessments.
- Instructional actions based on assessment results.

## **Differentiation in Assessments**

- Differentiated presentations.
- Differentiated expressions.
- Strategies that engage the brain.
- Maximizing brain development.

## **Three Tier Intervention Model – Tier 1**

## **Three Tier Intervention Model – Tier 2**

## **Three Tier Intervention Model – Tier 3**

## **Pedagogy**

The purpose of the Elementary Mathematics Endorsement courses is to ensure that practicing teachers gain the mathematical content knowledge needed to teach mathematical concepts to students in the elementary grades. Teachers must also, however, know how to transfer that content knowledge and the conceptual understandings inherent in the content to students. An understanding of sound pedagogical practice is essential to that transfer. Following are suggested pedagogical concepts and strategies that should be infused into the courses to aid teachers in student instruction. These concepts should never be taught in isolation, but should be modeled throughout the courses. It is not necessary nor intended that all the following concepts be infused in every course, but they should be covered in their entirety in the series.

### **Knowledge of mathematics curriculum and assessment:**

- Know common developmental paths (learning trajectories) related to foundational mathematical topics (e.g., place value, rational numbers and equivalence); understand these developmental paths, and use them to sequence activities to build learning environments that are developmentally appropriate and effective.
- Select, use, adapt and determine the suitability of mathematics curricula and teaching materials (e.g., textbooks, technology, manipulatives) for particular learning goals.
- Be cognizant of a formative assessment cycle (administering a formative assessment task, analyzing student work from the task, using that analysis to enhance teacher knowledge, and designing and teaching reengagement lessons) and resources.
- Provide appropriate interpretations of assessment results, and communicate results (in context) to specific individuals and groups (e.g., students, parents, caregivers, colleagues, administrators, policymakers, community members).

(Standards for Elementary Mathematics Specialists, Association of Mathematics Teacher Educators, 2009)

### **Possible Assignments:**

- Choose an objective from the mathematics core curriculum and design an assessment around that objective. Ensure that depth of conceptual understanding and procedural fluency are both addressed. Design a rubric to evaluate student work.
- Write a paper comparing and contrasting at least two commercially available assessment and intervention tools. At least one tool should have a technology (web-based) component. Discuss the research behind the tools, their possible use for informing teachers regarding students and instruction, and their limitations. Evaluate the probable effectiveness of each.
- Use CRT or benchmark data for a class to design an intervention strategy to close the achievement gap by improving student achievement. Discuss the data analysis which led to the chosen strategy, the research supporting the chosen strategy, and the implementation of the strategy. (If this course is taken during the school year teachers should use data from their own class and also evaluate the effectiveness of the intervention.)
- Readings from research on assessment and intervention.

- Creation of an intervention activity.
- Evaluation of student work on common assessments.

### **Suggested Texts:**

Popham, W. James. (2008). *Transformative assessment*. Alexandria, VA: Association for Supervision and Curriculum Development.

Fisher, Douglas et. al. (2008) *Checking for Understanding*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, Robert J. (2006) *Classroom Assessment and Grading That Work*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, Robert J. et. al. (1994) *Assessing Student Outcomes, Performance Assessment Using the Dimensions of Learning Mode.*, Alexandria, VA: Association for Supervision and Curriculum Development.

Shapiro, Edward S. (2004) *Academic Skills Problems, Direct Assessment and Intervention, 3<sup>rd</sup> Edition*. New York, NY: The Guilford Press.

Van De Walle, John. A., et. al. (2009) *Elementary and Middle School Mathematics, Teaching Developmentally (7<sup>th</sup> Edition)*. Boston, MA: Allyn & Bacon.

Gersten, Russell., et.al. (2009). *Assisting students struggling with mathematics: Response to Intervention (RtI) for elementary and middle schools* (NCEE 2009-4060). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://ies.ed.gov/ncee/wwc/publications/practiceguides/>.

*Utah's 3-Tier Model of Mathematics Instruction*. Salt Lake City, UT: Utah State Office of Education. Retrieved from [www.schools.utah.gov/curr/Math/Sec/documents/Utah's %203-Tier%20Model%20of%20Mathematics%20Instruction%20for%20web.pdf](http://www.schools.utah.gov/curr/Math/Sec/documents/Utah's%203-Tier%20Model%20of%20Mathematics%20Instruction%20for%20web.pdf)

### **Supplementary Texts/Readings:**

Tate, Marcia. (2003) *Worksheets Don't Grow Dendrites: 20 Instructional Strategies That Engage the Brain*. Thousand Oaks, CA: Corwin Press.

Sousa, David. (2006) *How the Brain Learns, Third Edition*. Thousand Oaks, CA: Corwin Press.

Reeves, Douglas. (2004) *Making Standards Work: How to Implement Standards in the Classroom School, and District, Third Edition*. Englewood, CO: Advanced Learning Press.

Hill, Bonnie, et. al. (1998). *Classroom Based Assessment*. Norwood, MA: Christopher-Gordon Publishers.

Hosp, Michelle. et. al. (2007) *The SBC's of CBM: A Practical Guide to Curriculum-Based Measurement*. New York, NY: The Guilford Press.

Rathvon, Natalie. (2008) *Effective School Interventions, Evidence-Based Strategies for Improving Student Outcomes, Second Edition*. New York, NY: The Guilford Press.