

## Teacher Quality Standard I

**Teachers demonstrate mastery of and pedagogical expertise in the content they teach. The elementary teacher is an expert in literacy and mathematics and is knowledgeable in all other content that he or she teaches (e.g., science, social studies, arts, physical education, or world languages). The secondary teacher has knowledge of literacy and mathematics and is an expert in his or her content endorsement area(s).**

*The key to distinguishing the knowledge base of teaching rests at the intersection of content and pedagogy.*

—L. S. Shulman

To teach all students according to today's standards, teachers need to understand subject matter deeply and flexibly so they can help students create useful cognitive maps, relate one idea to another, and address misconceptions. Teachers need to see how ideas connect across fields and to everyday life. This kind of understanding provides a foundation for pedagogical content knowledge that enables teachers to make ideas accessible to others. (Shulman, 1987)

Although Shulman's work dates back to the late 1980s, the importance of teacher content knowledge and pedagogical expertise has never been more important than it is now as teachers ensure students are college and career ready for the demands of the 21<sup>st</sup> century.

### Element C: All Teachers

**Teachers demonstrate knowledge of mathematics and understand how to promote student development in numbers and operations, algebra, geometry and measurement, and data analysis and probability.**

This section describes professional practices that should be demonstrated by ALL TEACHERS, regardless of grade level or subject.

*The great book of nature can be read only by those who know the language in which it was written ... and that language is mathematics.*

—Galileo

Professional practices referenced under each element of the Rubric for Evaluating Colorado Teachers are cumulative. Therefore, for teachers to be proficient in demonstrating knowledge of mathematics and how to promote student development of mathematical concepts and skills, they must encourage students to make explicit math connections to the content being taught. These connections can be emphasized by stressing the need to learn math skills and by using instructional strategies that require students to apply these skills. Students are supported in this work when the teacher emphasizes interdisciplinary connections and mathematical thinking.



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## **BASIC RATING LEVEL**

### **PROFESSIONAL PRACTICES: THE TEACHER:**

- ***Encourages students to make math connections across content.***

**The teacher who encourages students to make explicit math connections across content:**

- Identifies the specific math demands of the content area.
- Provides learning experiences and opportunities that support the application of students' general mathematical knowledge and skills.
- Uses the language of math while teaching, as appropriate.

**Examples of math connections across content areas:**

- Science
  - Measurement
  - Data analysis
  - Graphs
- Social studies
  - Measurement (timelines, map scales)
  - Reading numbers such as dates, populations, and percentages
  - Statistics and graphs
- Art
  - Spatial relationships (e.g., point of view/perspective)
  - Logical reasoning, patterns/form, when creating an artwork
  - Sequencing in process-based art making
- Physical education
  - Measurement
  - Computation skills
  - Ratios
  - Percentages
- Music
  - Differentiation between beat and rhythm
  - Subdivision, patterns/form
  - Time signatures; simple vs. compound meters
  - Temporal/spatial experiences and integrating body and mind
  - Crossing the midline (reaching across the body when playing instruments; moving to rhythm)
  - Analysis/performance of marching band drill formations
  - Rhythmic analysis of multiple parts of a performance piece

***See also Partially Proficient Professional Practice, Uses instructional strategies that require students to apply and transfer mathematical knowledge to different content areas.***

***Refer to this internal resource for additional information:***

- **Strategies for Employing Numeracy across Content Areas**  
Document lists strategies for employing numeracy in all content areas.



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