

Content Connections

Secondary Math



This past year, BVSD math teachers came together and identified effective practices that align with Boulder Valley Educator Effectiveness Standards 1 and 3. The identified connections are not evaluation criteria, but rather were created to provide examples of effective classroom instruction. This is an ongoing collaborative partnership that will continue to provide targeted examples.

Standard I: Teachers demonstrate mastery and pedagogical expertise in the content they teach

What does “Effective” look like in the classroom?	
Element a – Alignment	
Effective Lesson Planning	<ul style="list-style-type: none"> ● Provide opportunities for students to connect prior learning to new concepts ● Anticipate student solution strategies ● Prepare questions that provide students with multiple entry points to real-life problem situations (MP 1: Make sense and persevere in problem solving)
Respond to Student Misconceptions	<ul style="list-style-type: none"> ● Provide students the opportunity to check the reasonableness of their answer through error analysis ● Use formative assessment to identify misunderstandings ● Adapt instruction to address student misunderstandings/learning needs ● Clarify misconceptions through small group instruction ● Use concrete, pictorial and abstract representations to respond to student misconceptions
Collaborate Vertically and Horizontally	<ul style="list-style-type: none"> ● Use common language according to school practices and district curriculum ● Uses and values collaboration and communication to improve program implementation both horizontally and vertically. ● Shows awareness of 6-12 content standards and is well versed in standards for grades above and below the appropriate grade level ● Uses and values collaboration with colleagues of prior and subsequent grades to ensure articulation of standards and learning outcomes
Prepare Student for Next Level	<ul style="list-style-type: none"> ● Assess to show measurable growth ● Support all students to meet all standards for grade level ● Provide opportunities for students to address grade level vocabulary (MP 6: Attend to Precision) ● Make appropriate recommendations for course placement based on body of evidence

Element b – Literacy	
Provide Literacy Instruction	<ul style="list-style-type: none"> ● Regularly prompt students to explain their own thinking through oral and written communication (MP 3: Construct viable arguments; MP 6) ● Teach error analysis ● Foster peer evaluation ● Provide impetus for students to think critically, reason, collaborate, innovate, create, and use inquiry daily
Teach Students How to Apply Literacy Skills	<ul style="list-style-type: none"> ● Encourage students to write in complete sentences (MP 6: Precision) ● Provide students with opportunities to apply appropriate mathematical vocabulary when explaining their thinking (MP 6) ● Solve and explain problems in multiple ways (MP 4: Model With Mathematics; MP 5: Use Tools Strategically) ● Ask questions which have students metacognate about their processes, skills, and motivation ● Consistently encourage and or prompt students to explain how solutions are reached (MP 3)
Element c – Numeracy	
Connections to Math	<ul style="list-style-type: none"> ● Connect content with physics, science, history, poetry, etc. ● Discuss and demonstrate number sense ● Bring current events about mathematics into instruction
Knowledge of Math Concepts	<ul style="list-style-type: none"> ● Teachers make math lessons meaningful for all students regardless of prior understanding, language background, and special needs. ● Teachers demonstrate an understanding of mathematical learning progressions and use it in lesson planning, instruction, and differentiation techniques. ● Teachers employ discourse strategies to enhance learning of mathematical concepts. ● The Standards for Mathematical Practice are evident in instruction, and in student work and behaviors ● Teachers value quality of explanations and usage of multiple strategies as much as final solutions. ● Teachers continually seek to develop their own mathematical content knowledge and their understanding of how students learn math. ● Apply Algebra and Geometry concepts in Physics and Science
Element d – Content	
Appropriately Sequenced Lessons	<ul style="list-style-type: none"> ● Strategize the order that topics are taught ● Provide a variety of lesson structures ● Include note taking, teacher modeling, student modeling, student independent practice, partner work, small groups, and whole class discussion ● Understand how the goals of a lesson or unit fit within a mathematics learning progression

Explanations and Representation	<ul style="list-style-type: none"> ● Explicitly help students to develop graphical, verbal, numeric, visual, algebraic, approaches to similar problems (MP 4) ● Utilize concrete, pictorial and abstract methods to illustrate standards appropriate to student needs through structured opportunities ● Select tasks that allow students to decide which representations to use in making sense of problems
Inquiry Methods	<ul style="list-style-type: none"> ● Share examples, research, and experimentation ● Plan regular use of strategic questioning to include higher order questioning ● Provide student with opportunities for productive struggle by providing tasks and asking questions that scaffold students' thinking without stepping in to do the work for them. ● Use labs, projects, puzzles, and proofs (MP 3) ● Use summary techniques to solidify student inquiry experiences
Element e – Connectedness	
Build Connections	<ul style="list-style-type: none"> ● Connect content with physics, science, history, poetry, etc. ● Regularly integrates the history of mathematics into instruction to connect content areas ● Uses Algebra and Geometry concepts in Physics and Science
Element f – Relevance	
Students Make Connections	<ul style="list-style-type: none"> ● Use strategic warm-ups to activate prior knowledge ● Connect previous concepts to current or new learning instruction ● Provide rich and realistic opportunities for students to apply their learning ● Students make connections between multiple strategies presented by peers or the teacher
Addresses Learning Objectives	<ul style="list-style-type: none"> ● Implement flexible grouping ● Adapts instruction to meet students' needs ● Uses visual and concrete models to scaffold and extend learning

Standard II: Teachers establish a safe, inclusive and respectful learning environment for a diverse population of students

What does “Effective” look like in the classroom?	
Element a - Learning Environment	
Value Diverse Perspectives	<ul style="list-style-type: none"> ● Encourage different ways of thinking or approaching a problem ● Introduces the use of multiple strategies ● Applies concrete, pictorial and abstract models and allows their use
Model Respect for Diversity	<ul style="list-style-type: none"> ● Provide multiple opportunities for student voice

	<ul style="list-style-type: none"> ● Recognizes and builds-on diverse cultures in the classroom to design instruction (ex: group work, artistic expression, individual assessments) ● Include extensions to lessons for students ready for further exploration ● Provide access to grade level content regardless of specialized learning needs ● Use appropriate instructional strategies so that students who are not fluent in English can learn the language of mathematics at grade level or beyond ● Ensure that all students have access to high quality curriculum, instruction and the supports that they need to be successful (NCTM, <i>Principles to Action</i>)
Conducive for Learning	<ul style="list-style-type: none"> ● Foster an environment where students feel comfortable to make mistakes and use mistakes as a learning opportunity ● Create classroom management that creates a safe, structured environment ● Use sentence stems, norms and other structures to encourage respectful talk amongst peers. ● Encourage use of multiple strategies for finding solutions to provide students an atmosphere of successful sharing of thinking ● Teacher uses and refers to content and language objectives that are written in student friendly language that will assist in comprehensible input for all students ● Front loads academic language
Element b --Community	
Sense of Community	<ul style="list-style-type: none"> ● Develop a math community within the classroom with common goals and expectations ● Build community through the use of heterogeneous grouping ● Use collaborative learning strategies to increase EL student talk and engagement with content
Effective Student Interactions	<ul style="list-style-type: none"> ● Establishes structures and routines that communicate clear expectations for student interactions and create a safe environment ● Establish specific student expectations when working individually, in pairs, groups, etc. ● Students are helping one another without telling their classmates what the answer is or how to solve the problem
Respect for Differences	<ul style="list-style-type: none"> ● Promotes multiple strategies and perspectives in solving mathematics problems ● Encourage MP 4: Modeling Mathematics to encourage students to model their reasoning, thinking
Positive Social Relationships	<ul style="list-style-type: none"> ● Uses cooperative structures and clear expectations for discourse and group work ● Welcomes a variety of strategies and perspectives and uses them to enrich instruction

Element c – Student’s Strengths

Ask Challenging Questions	<ul style="list-style-type: none">● Uses a variety of formative assessment techniques to probe student understanding and metacognition● Implements the Cognitive Rigor/Depth of Knowledge matrix as a resource for creating challenging questions for a variety of learning needs● Provides differentiated assessment opportunities that encourage students to embark on appropriate challenge
Scaffold Questions	<ul style="list-style-type: none">● Uses awareness of student background knowledge and experience to develop appropriate levels of questioning● Strategically designs questions to provide avenues for students to further explore rather than “telling”
Wait Time	<ul style="list-style-type: none">● Provides students the option to respond “later” if not prepared to provide response (I will come back to you. . .)● Reserves correction, judgment, or criticism of student response● Provides appropriate opportunity for students to think and reflect prior to responding to questions
Flexible Grouping	<ul style="list-style-type: none">● Uses regular assessment to identify student strengths and grouping and regrouping for appropriate instruction● Provides students opportunities to select partners to collaborate with for completion of activities and/or projects● Grouping is based on learning styles and interests beyond academic skills
Total Student Participation	<ul style="list-style-type: none">● Provides structures, such as pair/ share that allow each student to participate in class discussion● Structures daily opportunities for a variety of student engagement tailored to student interests and strengths● Provides differentiated assessment opportunities that encourage students to embark on appropriate challenge● Encourages student engagement through the use of various “checks for understanding” models such as a thumbs up, interactive smartboards, clickers, white boards, exit tickets, journal writing , etc.

Element d – Differentiation

Solicit Input	<ul style="list-style-type: none">● Accepts the “our student” philosophy by collaborating with colleagues to develop a full picture of the student’s special needs● Aware of current research of “Eight Characteristics of Learning Disabled Students” and implements strategies that can impact student learning
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Differentiated Strategies	<ul style="list-style-type: none"> • Differentiates using number talks, videos, discussions with partners, groups, choice in problems, leveled assignments, and leveled assessments • Utilizes concrete, pictorial and algebraic models • Creates multiple entry points into each activity and standard
Adapt Instructional Strategies	<ul style="list-style-type: none"> • Demonstrates flexibility in planning • Uses a variety of re-teaching strategies as needed • Scaffolds and enriches content as appropriate
Challenge and Support Students	<ul style="list-style-type: none"> • Scaffolds and enriches instruction • Frontloads academic language specific to content area • Uses formative assessment to determine the need for scaffolding and enrichment • Differentiates to address varying student needs and provides extensions as needed • Provides students with various strategies and models to provide students access to connections between and among concepts • Implements a variety of assessment tools to ensure all students have the opportunity to demonstrate what they know and are able to do
Element e – Home/School Connection	
Partner with Families	<ul style="list-style-type: none"> • Recognizes that strategies for partnering with families may vary depending on cultural backgrounds • Uses multiple avenues for regular communication with guardians • Provides resources to families that clarify support at home
Coordinate Information	<ul style="list-style-type: none"> • Work closely with family and others to support student needs and successes
Seek Services and Resources	<ul style="list-style-type: none"> • Advocate for students to provide positive learning experiences • Is aware of and utilizes a variety of support services as appropriate for student success • Seeks resources and supports from other professionals
Frequent Family Communication	<ul style="list-style-type: none"> • Uses multiple avenues for regular communication with home guardians/parents/partners
Element f – Management for Learning	
Expectations Understood by Students	<ul style="list-style-type: none"> • Language and content objectives are written, discussed and referred to throughout daily instruction • Establishes a math community with routines, norms, and expectations around discourse and collaboration
Safe and Orderly Environment	<ul style="list-style-type: none"> • Uses clearly established routines, structures, and norms to create a physically and emotionally safe classroom

Appropriate Response to Misbehavior	<ul style="list-style-type: none"> ● Follows school and district behavioral guidelines ● Teacher provides specific norms of expected behavior and consequences for misbehavior
Maximum Use of Instructional Time	<ul style="list-style-type: none"> ● Strategically plans use of instructional time to allow for instruction, discourse, inquiry, scaffolding, assessment and group work with effective transitions

Standard III: Teachers plan and deliver effective instruction and create an environment that facilitates learning for their students

What does “Effective” look like in the classroom?	
<i>Element a - Child/Adolescent Development</i>	
Adapt Lessons to Strengths and Weaknesses	<ul style="list-style-type: none"> ● Uses a variety of research and evidence based instructional strategies ● Is responsive to students, parents, or other professionals, advocates for specific learning styles and needs
Implement Modifications and Accommodations	<ul style="list-style-type: none"> ● Aware of appropriate modification and accommodation strategies and implement as prescribed ● Applies research based strategies to provide opportunities for all students to access content
Knowledge of Current Developmental Science	<ul style="list-style-type: none"> ● Help students understand that they can become mathematical thinkers through effective instruction ● Include pedagogical strategies for kinesthetic, auditory, visual learners ● Can support instructional practices with research or evidence of effectiveness
Collaboration with Colleagues	<ul style="list-style-type: none"> ● Demonstrates use of collaboration with colleagues on pacing, formative assessment, scaffolding and enrichment
<i>Element b – Assessments</i>	
Adjustment Based on Assessment	<ul style="list-style-type: none"> ● Make frequent informal assessments to adapt lessons as appropriate ● Anticipates student misconceptions and plans accordingly ● Utilizes results of varied assessment tools to adjust lessons accordingly
Encouraging Academic Risk	<ul style="list-style-type: none"> ● Create an environment where students are comfortable with making mistakes and learning from them ● Scaffold how students give feedback to each other, such as sentence frames, so that students feel safe taking risks ● Support students who enroll in advanced courses to challenge themselves

	<ul style="list-style-type: none"> ● Provide various methods for students to provide teachers feedback regarding what they understand or need support learning
Student Success	<ul style="list-style-type: none"> ● Uses growth on common assessments to adapt instruction or scheduling ● Encourage student goal setting as a means of engagement and monitoring student success ● Celebrate student success
Element c – Effective Practices	
Clear Lesson Objectives	<ul style="list-style-type: none"> ● Language and content objectives are written, discussed and referred to throughout daily instruction ● Objectives are Standards based and in age appropriate language ● Key vocabulary is highlighted (MP 6)
Create Authentic Discussion	<ul style="list-style-type: none"> ● Structure, routines, norms and opportunities for Math Talks are integrated into daily lessons ● Ensure that students attend to precision in their use of academic language ● Use a variety of strategies that promote student voice ● Students explain how they solved a task and justify their reasoning
Student Reflection on Learning	<ul style="list-style-type: none"> ● Opportunities for students to reflect on their learning and advocate for their needs are part of the daily routine ● Teachers utilize formative assessment and student reflections to plan instruction ● Varied formative assessment formats are utilized as a means for checking for student understanding
Varied Instructional Strategies	<ul style="list-style-type: none"> ● Multiple strategies are utilized ● Concrete, pictorial and abstract models are utilized
Element d – Technology	
Research Effective Technology Approaches	<ul style="list-style-type: none"> ● Addresses MP 5: Use appropriate tools strategically to encourage students to decide which and when tools will be most effective for a given problem solving situation ● Teacher is fully engaged in instruction during technology use ● Seek out effective technology tools to use in instruction ● Utilize technology to enrich learning rather than replace instruction or discourse
Develop Student Knowledge and Skills	<ul style="list-style-type: none"> ● Allows students to construct depth of understanding through the use of appropriate technology ● Provide opportunities to learn and use technology for learning and communicating their ideas

Engaging and Motivating Experiences	<ul style="list-style-type: none"> ● Provides exploration and depth of concepts through the use of various technological programs ● Provides instructional activities that both challenge and motivate students ● Uses student interests and learning styles to design instructional activities
Digital Resources	<ul style="list-style-type: none"> ● Encourages the use of digital resources when appropriate ● Uses online resources to support, enrich and supplement in-class instruction
Element e – Critical Thinking	
Meet High Expectations with Support	<ul style="list-style-type: none"> ● Provides opportunities for students to share their thinking and reasoning with others (MP 3) ● Encourages students to Construct Viable Arguments and Critique the Reasoning of Others (MP 3) ● Plans for instructional strategies that include scaffolding, clear examples of desired outcomes and informative feedback ● Premeditates support for common student misconceptions and errors ● Allows for productive struggle and prompts students to think deeply rather than providing the answer
Higher-Order Thinking and Problem-Solving	<ul style="list-style-type: none"> ● Uses Cognitive Rigor to address Depth of Knowledge through higher-order questioning ● Plans questions in advance that will provide students with challenge and opportunities to delve into the content
Element f – Student Collaboration	
Grouping Matches Task and Needs	<ul style="list-style-type: none"> ● Provides varied opportunities for students to work in groups as well as individually ● Uses cooperative learning and roles as appropriate ● Avoids groupwork for the sake of groupwork and strategically plans for purpose and outcome of group work
Varied Groups	<ul style="list-style-type: none"> ● Differentiates groups as needed for the specific problem situation ● Mixes group members to allow students to work with various groups and provide a variety of problem solving strategies ● Uses flexible grouping strategies on a regular basis ● Strategically groups students for specific tasks
Students' Collaborative Efforts	<ul style="list-style-type: none"> ● When working in groups provides opportunities for students to engage in various roles ● Provides norms for students so that all are accountable for group work ● Provides explicit instruction on effective and respectful group work ● Gives feedback both individually and collectively

Element g – Communication Skills

Model and Teach Effective Skills	<ul style="list-style-type: none">● Addresses MP 6 as well as MP 3 as a means for modeling for students appropriate and accurate communication skills● Provides explicit instruction on respectful and appropriate oral discourse and written explanations
Practice Communication Skills	<ul style="list-style-type: none">● Provides opportunities for students to communicate in both oral and written forms● Regularly addresses MP 6 and MP 3● Provides daily opportunities for listening, speaking, reading and writing about mathematics

Element h – Feedback

Frequent Feedback	<ul style="list-style-type: none">● Provides immediate informal feedback to students regarding classwork● Provides specific feedback to students regarding what they understand or areas of need for additional instruction● Uses a variety of models for providing feedback, such as teacher to student, student to student, and self reflection● Constructive feedback specifically identifies the strengths and errors in student work● Feedback is timely in order to retain relevance
Students Using Feedback	<ul style="list-style-type: none">● Students are able to use the information provided by the teacher to adjust a misunderstanding or get additional instruction to clarify a misconception● Students are comfortable discussing areas of learning where they are struggling● Students are given opportunities to reflect on and learn from feedback in order to assimilate information into future learning situations● Feedback is provided so that students are able to build on strengths and address needs prior to summative assessments
Informal Assessment Methods	<ul style="list-style-type: none">● Teacher uses various differentiated methods for informal assessment of student understanding● Assesses students learning on a regular basis● Daily informal assessments● Uses informal assessments to build relationships with students● Uses informal assessments to create a holistic picture of the student as a learner