2020-2021 Mathematics Instructional Guidance for Diverse Learning Settings

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Full Document and Other Support

For the full version of this document that contains all content areas, and for other standards, content, and instructional support, see the website for the Office of Standards and Instructional Support

Table of Contents

Purpose

When CDE describes **best, first instruction**, it is assumed that instruction is occurring in a traditional environment: teachers and students gathered together in a classroom, working in small groups, large groups, and individually, and that there are no safety risks posed by having people in close proximity of each other or touching shared objects. Due to COVID-19, we can no longer assume that this traditional environment is possible or preferable under the current circumstances. Districts and schools have had to consider other options, including hybrid/blended learning, online-only options, or switching to remote learning on an emergency basis when circumstances require it. For most educators, this has created challenging teaching conditions—not only is teaching under these non-traditional settings challenging compared to the classroom environments teachers are accustomed to, but the uncertainty of the moment makes long-term planning and preparation especially difficult.

The purpose of this document is to provide some guidance under these uncertain times for each of the content areas addressed by the Colorado Academic Standards. While some compromises are inevitable when shifting instruction to non-traditional settings, maintaining high-impact instruction (or the highest-impact instruction under the circumstances) requires adherence to certain principles, practices, and strategies. Teaching is a very complex endeavor and while it isn't possible to cover every approach, tool, or practice for every situation, this document aims to inform educators about what teaching should ideally look like given a variety of instructional settings.

Teaching and Learning in Diverse Learning Settings

In March of 2020, schools in Colorado made on-the-fly decisions and took quick action to change the way teaching and learning worked across the state. Several terms emerged to describe the different settings school was happening in, such as *online*, *virtual*, *remote*, and *at home*. To attempt to clarify the language used to describe these settings, this document refers to the following categories:

- **In-person learning:** Face to face instruction within a brick and mortar structure.
- **Hybrid/blended learning**: A combination of in-person learning and remote learning.
- **Online-only learning:** Online learning in Colorado refers to schools that are providing online course offerings on a full or part-time basis. Students who engage in online learning in this context are enrolled in an approved school or program or may be taking an online course to supplement.
- **Remote learning:** Education that occurs away from a school building in response to emergency situations such as COVID-19 or natural disaster. Remote learning seeks to offer continuous educational opportunities that may or may not build upon previously taught content. Remote learning is both a temporary and longer-term option. Remote learning may include digital resources and/or hard copy resources and may include synchronous or asynchronous instruction and/or self-paced independent study work.

Even with these categories and definitions, other variations are possible. For example, in-person learning *with* an enforcement of social/physical distancing will certainly have some constraints that in-person learning *without* social/physical distancing. Similarly, online and remote learning looks very different when it is conducted synchronously rather than asynchronously.

Content-Specific Resources to Support Diverse Learning Settings

CDE's top priority continues to be the health and safety of all students, educators, and communities in Colorado. To help schools plan for educational continuity while the suspension of in-person learning is in effect, we have curated a list of best practices for remote learning and teaching including free web-based resources to help keep students academically engaged. We recognize that the multitude of resources for remote learning can be overwhelming so we have collected and organized material by content area and grade level that may be useful as educators develop plans for their students. While remote learning through the Internet provides a great deal of flexibility in learning opportunities, educators should also consider utilizing hard copy resources (e.g., packet work, textbooks).

There is no requirement for districts to offer remote learning via the Internet, but if educators decide to go this path, they should strive to include equitable access to instruction for all students. Equitable access does not require that all students receive instruction in the same format e.g., online instruction). Districts should consider the individual learning needs of students in determining how to best meet individual needs. Click here for a curated list of resources across content areas.

Equity Considerations for Learning Across Settings

Regardless of the instructional setting, or how it changes in 2020-2021, we suggest you consider the following do support students and their families:

- Support **flexible scheduling and limited technology access when shifting to hybrid/blended or remote** learning settings. Student learning should not be solely dependent on access to devices and the internet. Encourage approaches that can be pursued without technology and/or asynchronously to set students up for success.
- Engage students in **meaningful** explorations, investigations, inquiries, analysis, and/or sense-making. Equitable learning experiences should be both responsive to the current need as well as meaningful to learners.
- When in remote or hybrid settings, encourage students to engage in **activities that already happen in their homes with materials that families already have** (especially so families do not need to purchase additional supplies). Families in poverty may be experiencing several of the considerations described above, along with additional concerns including regular access to meals, utilities, health services, or shelter. Undocumented students and students receiving special education services may face challenges in accessing resources that they need. Encourage educators to prioritize the physical, mental, and emotional well-being of all students.
- Help students make **explicit connections to their interests and identities**.
- **Invite family members to be a partner** in students' learning. Students and families may need to juggle home, caretaking, school, and work responsibilities. Consider a menu of options for learning experiences that allow for different types and levels of engagement during remote learning.
- Provide students with **choices for how they engage, what they investigate/research, or how they demonstrate learning.**
- Support students in **self-reflection** related to content and process to support their learning.
- **Exercise sensitivity** when referencing the current pandemic as a topic for instruction.

- Encourage, support, and facilitate **first-language family participation** in the learning across multiple settings. Take steps to bridge the gap in access to bilingual and native language resources that support learning for students and their families.

General Considerations for Standards-Aligned Instruction

The guidance provided below gives educators insights into "traditional" teaching practices and how shifts in those teaching practices can lead to student learning experiences that are more authentic and engaging in diverse learning settings. These shifts support instructional alignment with the 2020 Colorado Academic Standards.

Learning experiences should look less like…	Learning experiences should look more like…
An attempt to recreate school at home during learning: • assuming a **strict "school day" schedule** • **requiring special materials** (e.g. materials not commonly found at home) • pacing with the **planned scope and sequence in remote learning environment** • assigning **readings** to stay "caught up" • packet of **worksheets and busy-work** • all learning experiences happen **virtually**	**Flexible goals and structures for learning** • **extended time** for learning and reflection • use of **commonly available materials** • **purposeful selection of learning targets** • allowing students to **explore their interests** • **meaningful, manageable tasks and projects** • **opportunities to learn without the use of devices or the internet**
Teacher-centered instruction • virtual lectures/classes that all students **synchronously** attend • teachers **delivering information and assignments** • teacher instruction and feedback as the **primary mode** of facilitating learning	**Purposeful teacher-student interactions** • **optional** opportunities to connect with teachers and peers **virtually and at a variety of times** • teachers providing **coaching, feedback, and encouragement** • encouraging **students to engage in learning and reflection with their families and communities** • encouraging **self-reflection** on what students learn and how they learn it
Assignments to "get through" content • **emphasizing memorizing content** or "checking off" tasks on lists • asking students to **complete tasks that are irrelevant, lack authenticity, or are redundant in nature** (e.g., "busy work") • trying to cover content through a volume of activities or skipping from topic to topic	**Assignments that promote authentic learning** • **connecting experiences to household activities,** like cooking, fixing things, or gardening, community interactions • asking students to **identify relevant problems** in their lives and **leverage content knowledge** to address them • allowing students to **deeply explore concepts, topics, phenomena (science), and/or problems of interest** through investigation, analysis, research, and other sense-making strategies to build understanding and practice over time

Instructional Guidance by Content Area

CDE's Office of Standards and Instructional Support stands behind the saying, "All Students, All Standards." The Colorado Academic Standards define learning goals in each content area. By providing a high-quality, standards-based educational experience for students in each of the content areas, schools open doors of opportunity to students' futures. By experiencing high-quality teaching and learning in a variety of content areas, upon graduation students should be prepared to seek out and find success in multiple career fields, college majors, or other future endeavors connecting to any one or more of the content areas for which Colorado has academic standards.

Unlike other sources of guidance for the 2020-2021 school year, the guidance below gives equal preference to each content area. **This is not a guide for narrowing the curriculum down to mathematics and English language arts**. Instead, it is our goal that schools consider the guidance provided and strive to offer well-rounded, enriching, opportunity-creating educational experiences for all students, regardless of the instructional setting.

Mathematics

In June of 2020, the National Council of Teachers of Mathematics (NCTM) and NCSM: Leadership in Mathematics Education jointly released *Moving Forward: Mathematics Learning in the Era of COVID-19*. This document was organized around three major areas to consider when planning for the 2020-2021 school year: (1) structural considerations, (2) teaching practices, and (3) advocacy. The table below summarizes some of the major points of that document, but in no way should it replace reading and carefully considering all the major points, guiding questions, and recommendations from the original 18-page document.

Moving from less like…	Moving to more like…	Strategies	Resources or Tools to Try
Structures that organize students for instruction that (a) tracks or groups students by ability, either within a class or across classes, (b) relies on singular or inflexible approaches to learning in Tier 1 instruction, and/or (c) replaces grade-level instruction with remedial mathematics for students based on some prior standardized test score.	Structures that organize students for instruction that (a) detracks students into heterogeneous groupings, with high expectations for all, (b) provides support in Tier 1 instruction that allows for a range of approaches to problem solving, and (c) uses formative assessment to provide just-in-time, as needed interventions during the school day that do not replace daily, grade-level instruction.	Educators should (a) assign students to teachers that ensure heterogeneous ability groups, (b) be mindful of potential inequalities, such as access to technology, (c) create groups of students with mixed strengths within classes to collaborate on rich tasks using a variety of digital and print media, and (d) prioritize mathematics by providing time for planning and implementing instruction and interventions.	Catalyzing Change Just Equations *Go Figure* Report Visibly Random Groups

Moving from less like…	Moving to more like…	Strategies	Resources or Tools to Try
Structures for teachers that (a) tracks teachers so that the most experienced and successful teachers only teach the most successful or privileged students and/or (b) rely on teachers to make their own way or to improvise/stumble their way to providing better instruction.	Structures for teachers that (a) assign heterogeneous classes of students to all teachers, and balance entry-level with upper-level classes for high school teachers, and (b) provide regular professional learning to grow their skills, plan collaboratively for flexible instruction, and focus on cycles of continuous improvement.	Educators should (a) create vertical teams that design and implement tasks that incorporate relevant material from previous grades into grade-level work and (b) provide teachers with relevant professional learning, like teaching students with trauma or engaging students remotely.	Looping Team or Co-Teaching
Determine essential learning for all students that (a) assumes students need to be met "where they're at," (b) reflects the limited challenges from low-quality instructional materials, whether from a textbook or cobbled together from hastily vetted internet sources, and/or (c) relies on unilateral decisions about curriculum planning.	Determine essential learning for all students that (a) collaboratively develops a shared understanding of the mathematics that is absolutely essential for all students to learn, (b) provides a viable curriculum that focuses on the major work of each grade and moves students along a progression of learning across grades, and (c) strategically uses topics designated as supporting and additional work of the grade to build and reinforce students' learning of major work.	Educators should (a) focus most, but not all, time and energy on those standards recognized as major work of the grade, (b) deeply understand the progressions of learning represented in the mathematics standards, and (c) communicate essential learnings to all stakeholders and allocate the time and resources to make it happen.	Catalyzing Change Series Progressions of Learning Resources Focus by Grade Level Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics Developing Essential Understanding Series

Moving from less like…	Moving to more like…	Strategies	Resources or Tools to Try
Determine necessary prior knowledge by (a) viewing students in terms of their weaknesses or "lost" learning, (b) using back-to-school testing of a laundry list of prerequisite understandings, and/or (c) begining the school year with (re)teaching content from prior grades.	Determine necessary prior knowledge by (a) viewing students in terms of their strengths and creating learning opportunities to move them forward, (b) collaboratively identifying prerequisite understandings for each unit of study and planning to support students to make connections with past learning, and (c) strategically teaching necessary skills or understandings "just in time" as they are needed throughout the school year.	Educators should (a) Know which prior grade-level standards students did and did not have an opportunity to learn, (b) know which topics were addressed primarily through remote instruction, (c) collaborate to identify and weigh the possible consequences of unfinished learning from the prior year.	Progressions of Learning Resources Coherence Gap spreadsheet Mathematics Unit Planning in a PLC at Work Protocol to Determine Prior Knowledge for a Mathematics Unit
Determine what students know and introduce new learning by (a) relying on pre-tests (or last year's post-tests) and/or (b) looking only at right and wrong answers (or some abstracted scale score) as a measure of current student understanding.	Determine what students know and introduce new learning by (a) selecting and using formative assessment strategies to understand what students know and plan to build new learning on their strengths and (b) use open-ended and constructive response tasks to gather insights about student successes and struggles before modifying instruction accordingly.	Educators should (a) use rich tasks to replace typical pre-testing and post-testing, (b) analyze rich tasks to predict how they may provide insights about unfinished learning on prior essential understandings, (c) maximize instructional time to focus on math teaching and learning, and (d) leverage technology to gather insights about what students know and understand.	Great Modeling Tasks in Three Acts NCSM Great Tasks for Mathematics Series High School Mathematics Lessons to Explore, Understand, and Respond to Social Injustice NCTM Activities with Rigor and Coherence Principles to Actions Professional Learning Toolkit Using Talk to Make Sense of Mathematics The Formative Five Jump Start Formative Assessment

Moving from less like…	Moving to more like…	Strategies	Resources or Tools to Try
Teaching practices that follow a simple cycle of working examples for students, assigning practice problems, and scoring work as right or wrong.	Teaching practices that reflect the full range of effective mathematics teaching practices to set quality goals, choose good tasks, engage students in high-quality discourse, build fluency on top of understanding, and use evidence of student thinking.	Educators should (a) focus student learning goals on meaningful shifts of understanding to be brought about through instruction, not just tasks to be completed or routines to be performed and (b) engage in collaborative planning to choose quality tasks, pre-select purposeful questions, anticipate student strategies and struggles, and learn from each other over time.	Good Questions More Good Questions 5 Practices for Orchestrating Productive Mathematics Discussions 5 Practices in Practice Series Discourse Actions to Promote Student access High-Yield Routines for Grades K-8 Taking Action Series Principles to Action Professional Learning Toolkit Strengths-Based Teaching and Learning in Mathematics
Policies and budgetary decision making that (a) tries to do more with less, (b) assumes that overcoming obstacles is a simple matter of individual teacher time and effort, and/or (c) spends money and allocates resources in a patchwork fashion rather than making a long-term investment in teacher capability and student learning.	Policies and budgetary decision making that (a) ensures schools have the means, resources, and support to provide meaningful mathematics teaching and learning, (b) plans for contingencies that could disrupt mathematics learning, such as school closures or modified schedules, and (c) ensures that all students have the tools, technology, and access to fully engage in mathematics learning regardless of instructional setting.	Educators should (a) look for and understand the resources available at national, state, and local levels, (b) humanize the situation with policymakers and stakeholders so everyone understands the impact of fiscal decisions, (c) allocate resources so that every student is provided access to grade-level content and quality teaching, and (d) advocate for the necessary leadership and support that teachers need to work through challenging conditions.	

Moving from less like…	Moving to more like…	Strategies	Resources or Tools to Try
Assessment practices that (a) assume summative test results are always valid and reliable, (b) assess all students frequently at the cost of lost instructional time, and/or (c) assess all students the same way out of regard for "fairness," without considering other evidence or individual student needs.	Assessment practices that (a) grapple with the systemic impacts school disruptions have on assessment results (particularly large-scale summative assessments) and how their validity and reliability could be compromised and (b) ensure assessments are demonstrably connected to content and can result in action.	Educators should (a) think about systemic impacts that can affect the validity and reliability of assessment results, (b) consider other metrics to understand the educational health, wellbeing, and recovery of the local educational system, (c) carefully weigh the benefits of any assessment against the sacrifice of instructional time.	
Professional learning and collaboration that relies on one-shot, content-agnostic approaches to staff development.	Professional learning and collaboration that (a) creates a culture of sustained, job-embedded professional development through the use of mathematics coaches and instructional specialists and (b) prioritizes time for regular meetings between grade-level and course-alike teachers with efforts focused on shared visions of assessment, grading, intervention, and lesson planning.	Educators should (a) increase transparency with stakeholders using clear, frequent communication and (b) elevate teachers' voices and solicit feedback from all stakeholder groups, including administrators, teachers, and parents.	

Resources to Support Diverse Learning Settings in Mathematics

- https://www.cde.state.co.us/comath - CDE's main page for mathematics standards, curriculum support, instructional support, and community information
- https://www.cde.state.co.us/comath/2020-2021 - Resources and guidance specific to planning for and teaching mathematics in the 2020-2021 school year