2020-2021 Computer Science 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.

Computer Science

Moving from less like…	Moving to more like…	Instructional Strategies & Computer Science Practices	Tools to Try
Rote memorization of facts and terminology	Facts and terminology learned as needed while developing explanations and designing solutions supported by evidence-based reasoning and arguments.	Discipline-based Questions Investigation/Inquiry Teacher Modeling Problem-Based Learning Think-aloud	Question Formulation Technique STEM Teaching Tools Teacher Modeling Problem-Based Learning Think-aloud Investigation/Inquiry
Learning ideas disconnected from questions	Systems thinking and modeling to give context for the ideas to be learned	Discipline-based Questions Concept Attainment Investigation/Inquiry Teacher Modeling	Question Formulation Technique Concept Attainment Investigation/Inquiry Teacher Modeling
Teachers providing information to the whole class	Students conducting investigations, solving problems, and engaging in discussions with teachers' guidance	Problem-Based Learning Process Oriented Guided Inquiry Learning Cooperative Learning Activities	Problem-Based Learning POGIL STEM Teaching Tools Cooperative Learning Collaborative Learning
Siloed activities which focus on independent learning.	Collaborative learning to build critical thinking and problem solving in order to promote a more inclusive student community. This encourages students to develop important 21st century skills such as communication teamwork, and an appreciation of diversity.	Pair Programming Peer Instruction Process Oriented Guided Inquiry Learning Cooperative Learning Activities	On Pair Programming POGIL Cooperative Learning Collaborative Learning

Moving from less like…	Moving to more like…	Instructional Strategies & Computer Science Practices	Tools to Try
Teaching computer science within a vacuum.	Making use of computer science's ability to make interdisciplinary connections. In our society computer science has an ever-increasing presence within other fields such as medicine, manufacturing, energy, and agriculture to name a few. Making use of colleagues or community members from other fields can also supply students with role models, and the ability to see themselves within the field.	Problem-Based Learning Interdisciplinary Connections	Problem-Based Learning Interdisciplinary Connections
Teachers posing questions with only one answer	The idea that effective question development often requires advanced preparation in order to engage the desired thinking within students. Use questions which encourage students to explore the reasoning behind their answer, and if using single answer questions require content-based answers rather than simple "yes" or "no."	Socratic Seminar Discipline-based Questions Roleplay & Simulation Document Based Questions	Socratic Seminar Question Formulation Technique Roleplay & Simulation

Moving from less like…	Moving to more like…	Instructional Strategies & Computer Science Practices	Tools to Try
Students reading textbooks and answering questions at the end of the chapter, or the use of worksheets as the sole route of knowledge transfer.	Instructional methods which allow students to actively engage with the content in a more inclusive manner. Direct textbook instruction, or the use of worksheets as the sole method of knowledge transfer do not consider the many different learning styles seen in students. For others with cognitive delays or English learners this can be an insurmountable challenge.	Problem-Based Learning Design Journal Culturally Responsive Teaching Universal Design for Learning	Student Engagement Problem-Based Learning Design Journal Addressing Diverse Learners Universal Design for Learning
Pre-planned outcomes for “cookbook” activities	Much like building endurance when reading computer science encourages students to build persistence in the face of challenging concepts. It is recognized that students are more likely to persist in the face of a challenge when the content is personally relevant. This can be achieved by designing lessons to include real-world issues, problems, and applications.	Authentic Learning Problem-Based Learning Design Journal Roleplay & Simulation	Authentic Learning Problem-Based Learning Design Journal Roleplay & Simulation

Moving from less like…	Moving to more like…	Instructional Strategies & Computer Science Practices	Tools to Try
Oversimplification of activities for students who are perceived to be less able than their peers	Stereotyping a student with expectation of poor performance will often affect their performance. This possibility can be mitigated through communicating your high expectations for the student, the use of frequent effective feedback, and providing positive role models.	Authentic Learning Problem-Based Learning Socratic Seminar Stereotype Threat Mitigation Culturally Responsive Teaching Universal Design for Learning	Authentic Learning Problem-Based Learning Socratic Seminar Stereotype Threat Universal Design for Learning