FROM THE COLLEGE AND CAREER READY STANDARDS TO TEACHING AND LEARNING IN THE CLASSROOM: A SERIES OF RESOURCES FOR TEACHERS

FUNDAMENTALS OF LEARNING

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ORGANIZATION

INTRODUCTION

This resource is part of a series produced by the Center for Standards and Assessment Implementation (CSAI) to assist teachers and those who support teachers to plan teaching and learning from College- and Career-Ready Standards (CCRS) for diverse learners. This resource uses the Common Core State Standards (CCSS; National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010) and the Next Generation Science Standards (NGSS; Next Generation Science Standards: For States, By States. NGSS Lead States, 2013) as examples of CCRS. This publication provides a framework, the Fundamentals of Learning (FOL), to assist teachers in transitioning to the classroom practices called for in the CCRS.

The content of this resource is drawn from leading theory and research about learning and assessment and from an examination of the CCSS and NGSS. A section on background reading is included at the end.

Since it is the students who actually DO the learning, this resource focuses on three fundamental aspects of learning that underpin classroom practice for K-12 students' attainment of the CCRS.

The Fundamentals are:

(1) Making Meaning

(2) Participating and Contributing

(3) Managing Learning

Future resources will address how teachers can use the FOL framework to plan lessons from the CCRS that enable students to successfully engage in these Fundamentals of Learning and reach the high expectations that have been established by the standards.

Acknowledgement:
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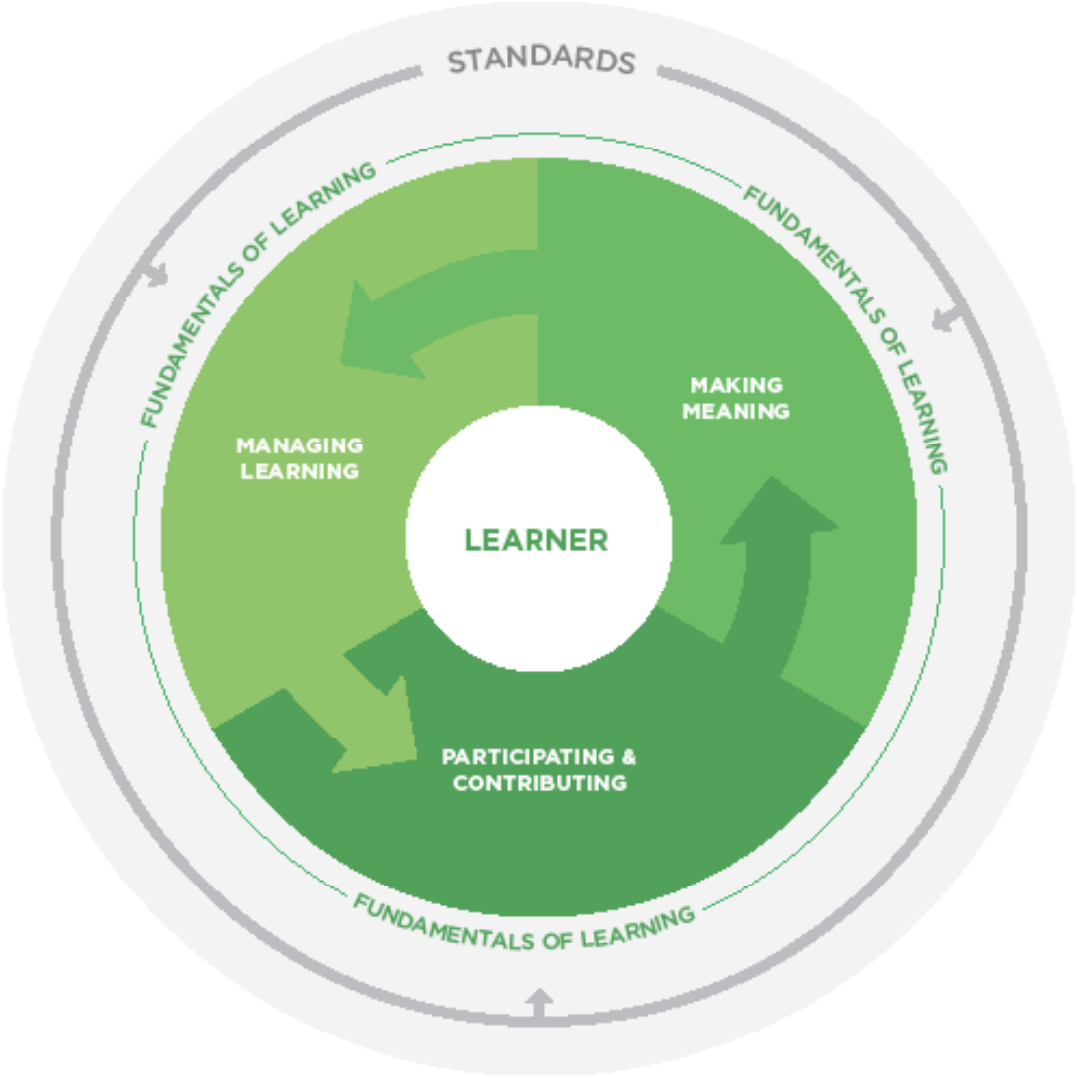
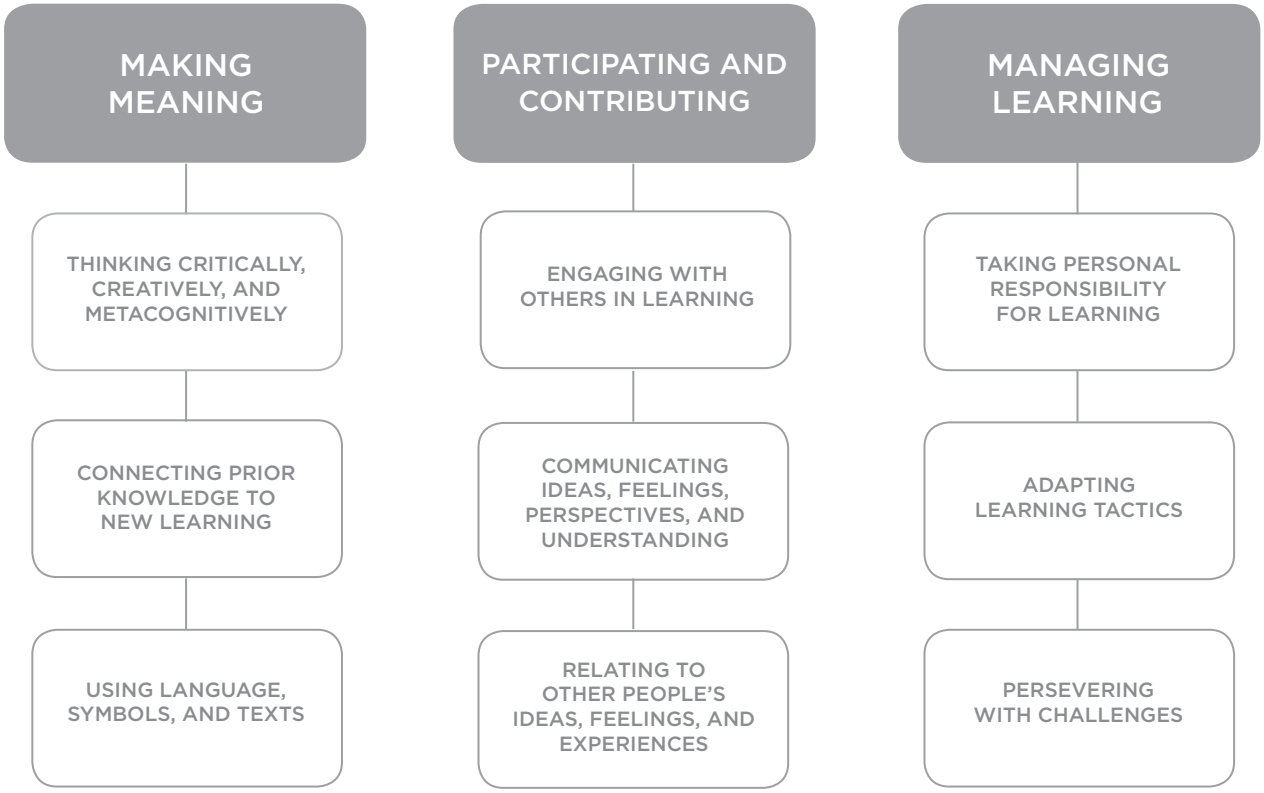
FRAMEWORK

The Fundamentals of Learning are the means through which learners achieve the Content Standards during their daily learning opportunities in the classroom. Because of this, they have implications for all aspects of planning and teaching, including content, learning activities and tasks, resources, language used, the role that both students and teachers take in the learning process, and the culture of the classroom. The graphic below shows the integrated nature of the Fundamentals in student learning.



INSIGHTS INTO THE FUNDAMENTALS

Three main components of each Fundamental are shown below:



MAKING MEANING

Meaning making refers to the process of making sense of information, experiences, and ideas through the use of creative, critical, and metacognitive thinking skills. When students employ these thinking skills, they are able to evaluate information, reason, solve problems, analyze and construct arguments, make decisions, and regulate their own learning.

When students are engaged in meaning making, they draw on their prior knowledge by asking themselves what they already know about a topic or concept and how this knowledge connects to what they are currently learning. They activate this knowledge as the basis for creating new knowledge.

Students also make meaning of the codes in which knowledge is expressed – language, symbols, and texts. Languages and symbols are systems for representing and communicating information, experiences, and ideas. People use languages and symbols to produce text of all kinds: written, oral/aural, and visual; informative and imaginative; informal and formal; mathematical, scientific, and technological.

PARTICIPATING & CONTRIBUTING

Engaging with others in learning involves working cooperatively to acquire information, share and discuss ideas and interpretations, and obtain feedback. Participating in and contributing to learning communities allows students to see learning as a co-constructed process in which mistakes are understood as potentially valuable opportunities for further learning. As students explain, clarify, and critique their own and others' ideas, their cognitive engagement increases and they develop a sense of belonging and shared responsibility for learning.

The depth and quality of student learning is greatly influenced by the capacity and opportunity to effectively communicate ideas, feelings, perspectives, and understanding. Additionally, the learning community is enriched and made more relevant as students contribute their personal experiences. Through thoughtful, extended discourse, by making suggestions, and by expressing their opinions and understanding, students actively participate in their learning and the learning of others.

Student learning is enhanced when students are able to interact effectively with a diverse range of people, in a variety of contexts, through various modes of communication. By listening to others, by reading what others have written, by observing others, and by being open to others' viewpoints, students can develop empathy and benefit from learning that may be outside their own experience.

MANAGING LEARNING

Managing learning involves self-direction and taking initiative. In the process of managing their learning, students see themselves as active, capable learners who can make sense of, take risks with, and work on increasingly complex problems. When working with others, they know when to lead, when to follow, and when and how to act independently.

Students who manage themselves are mindful, resourceful, reliable, and resilient. They establish personal goals, make plans, monitor progress, and adapt their learning tactics when they need to do so.

They have strategies for meeting challenges and gain satisfaction from persevering to meet the high expectations they set for themselves.

IN PRACTICE

WHAT WOULD THE LEARNING FUNDAMENTALS LOOK LIKE IN CLASSROOM PRACTICE?

Below are some indicators of what the Fundamentals of Learning might look like in practice.

As you prepare to implement the College- and Career-Ready Standards, use these indicators to reflect on your own practice and think about what you do well and what you might need to strengthen.

STUDENTS ARE LIKELY TO:

MAKING MEANING

- Ask questions of themselves, the teacher, and others
- Take time to think
- Tackle real and interesting problems and devise solutions
- Reason and justify thoughts
- Draw on personal knowledge and experience

PARTICIPATING AND CONTRIBUTING

- Take an active role in the processes of learning
- Give thoughtful, extended answers
- Contribute to and benefit from the learning of others
- Discuss and explore ideas
- Gain insights from others' similarities and differences
- Work in groups of different sizes and compositions and with various individuals
- Cooperate and take the lead as appropriate in groups
- Feel able to make suggestions

MANAGING LEARNING

- Be interested in their learning
- Show perseverance in learning
- Be reflective about their own learning
- Be (or become) confident in learning
- Be resourceful about learning
- Take risks
- Learn from mistakes

TEACHERS ARE LIKELY TO:

- Make connections between new and prior learning
- Integrate assessment and instruction
- Alter and adapt plans in response to learners
- Revisit learning plans with students
- Balance teaching approaches (didactic and student-initiated; practical and theoretical)
- Allocate sufficient time for deep learning

MAKING MEANING

- Structure the classroom for participation
- Engage in sustained discourse with students
- Show themselves as learners

PARTICIPATING AND CONTRIBUTING

- Be sensitive observers of their students
- Assist students to monitor their own learning
- Provide feedback to students
- Be willing to make changes
- Work collaboratively with colleagues

MANAGING LEARNING

CONTENT IS LIKELY TO:

- Align to the CCRS
- Be comprehensible
- Draw on authentic contexts—related to things that are happening in the local and global community
- Relate to students' existing knowledge and experience
- Broaden and deepen students' learning

MAKING MEANING

- Be seen by students as relevant
- Enable students to find personal expression
- Sustain students' interest

PARTICIPATING AND CONTRIBUTING

- Be (or become) interesting to students
- Help students make connections within and across standards
- Meet students' present and prospective needs

MANAGING LEARNING

RESOURCES ARE LIKELY TO:

- Come from a range of resources: local, national and global
- Draw on diverse perspectives and forms of communication
- Include a range of media

→ MAKING MEANING

- Be sourced not only by teachers, but also by students, parents, community members, and others
- Encourage collaboration
- Be shared among students

→ PARTICIPATING AND CONTRIBUTING

- Be perceived as relevant and useful
- Expand students' approaches to learning

→ MANAGING LEARNING

ACTIVITIES AND TASKS ARE LIKELY TO:

- Take students into real, authentic contexts
- Be purposeful and worthwhile
- Have high cognitive demand for all students
- Lead to deep learning
- Engage students' interest

→ MAKING MEANING

- Be for both individuals and groups

→ PARTICIPATING AND CONTRIBUTING

- Allow for differences
- Be flexible and adaptable
- Be dynamic—activities that lead to and generate other activities unforeseen
- Include student reflection

→ MANAGING LEARNING

THE CLASSROOM CULTURE IS LIKELY TO:

- Focus on learning
- Generate inquiry and new ideas

MAKING MEANING

- Feel like a place where students have a say
- Encourage questions, contributions, suggestions, and learning from mistakes and successes
- Enable risk taking
- Value every students' contribution

PARTICIPATING AND CONTRIBUTING

- Embrace flexibility
- Support reflection

MANAGING LEARNING

LANGUAGE IS LIKELY TO:

- Focus attention on thinking in the content areas
- Be used in extended discourse

MAKING MEANING

- Invite students to participate in learning
- Reflect the routines and norms of the learning community
- Be used for resolution of disagreements and acknowledgement

PARTICIPATING AND CONTRIBUTING

- Be used in internal regulation
- Be used for communicating intentions, for negotiation, and expressing learning processes

MANAGING LEARNING

REPRESENTATIVE TOUCH POINTS WITH CCRS

The Fundamentals of Learning are represented in the CCSS and NGSS documents. In the ELA standards documents, the connections between the fundamentals and the standards can be found in the section "a portrait of students who meet the standards" (p. 7), as well as in the anchor and grade level Content Standards. In mathematics, the fundamentals are reflected in the Mathematics Practice Standards (pp. 6-8). For science and engineering, the fundamentals are similarly echoed in the Science and Engineering Practices and the NRC Framework. These sections of the CCSS and NGSS documents frame the process of students' achieving the Content Standards.

The representative touch points listed here present some main ways in which the CCSS and NGSS are reflected in the Fundamentals of Learning. Below are excerpts from the CCSS and NGSS documents (www.corestandards.org, www.nextgenscience.org, and NRC Framework, 2012) organized by learning fundamental.

MAKING MEANING

Students who are *Making Meaning* in English Language Arts:

- Question an author's or speaker's assumptions and premises and assess the veracity of claims and the soundness of reasoning (PS4)[1]
- Employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use (PS6)
- Read literature representative of a variety of periods, cultures, and worldviews (PS7)
- Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence (CCRA.R.8)[2]
- Draw evidence from literary or informational texts to support analysis, reflection, and research (CCRA.W.9)[3]
- Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric (CCRA. SL.3)[4]

Students who are *Making Meaning* in Mathematics:

- Create a coherent representation of the problem at hand (MP3)[5]
- Attend to the meaning of quantities, not just how to compute them (MP3)
- Routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense (MP4)
- Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions (MP5)
- Examine claims and make explicit use of definitions (MP6)
- Step back for an overview and shift perspective (MP7)
- See complicated things, such as some algebraic expressions, as single objects or as being composed of several objects (MP7)

Students who are *Making Meaning* in Science and Engineering:

- Ask a question about data that will lead to further analysis and interpretation (P1)[6]
- Ask and refine questions that lead to descriptions and explanations of how the natural and designed world(s) works and which can be empirically tested (P1)
- Clarify problems to determine criteria for successful solutions (P1)
- Identify constraints to solve problems about the designed world (P1)
- Science: Ask questions of each other about the texts they read, the features of the phenomena they observe, and the conclusions they draw from their models or scientific investigations (P1, NRC[7])
- Engineering: Ask questions to define the problem to be solved and to elicit ideas that lead to the constraints and specifications for its solution (P1, NRC)
- Evaluate and refine models through an iterative cycle of comparing their predictions with the real world (P2)
- Use and construct models as helpful tools for representing ideas and explanations (P2)
- Design investigations that generate data to provide evidence to support claims they make about phenomena (P3)
- Identify the effectiveness, efficiency, and durability of designs under different conditions (P3)
- Plan and carry out several different kinds of investigations (P3, NRC)
- Engage in investigations that range from those structured by the teacher… to those that emerge from students' own questions (P3, NRC)
- Present data as evidence to support their conclusions (P4)
- Use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data (P4)
- Identify sources of error in the investigations and calculate the degree of certainty in the results (P4)
- Represent physical variables and their relationships, and to make quantitative predictions (P5)
- Engage in computational thinking, which involves strategies for organizing and searching data, creating sequences of steps called algorithms, and using and developing new simulations of natural and designed systems (P5)
- Predict the behavior of systems and test the validity of such predictions (P5)
- Develop own explanations of phenomena based on students' observations or student-developed models (P6, NRC)
- Designing solutions to problems [as] a systematic process that involves defining the problem, then generating, testing, and improving solutions (P6)
- Refine design ideas based on the performance of a prototype or simulation (P6, NRC)
- Read and produce domain-specific text… the genres of texts that are intrinsic to science and engineering (P8, NRC)

PARTICIPATING AND CONTRIBUTING

Students who are *Participating and Contributing* in English Language Arts:

- Independently discern a speaker's key points, request clarification, and ask relevant questions (PS1)
- Listen attentively (PS2)
- Share their knowledge through writing and speaking (PS2)
- Adapt their communication in relation to audience, task, purpose, and discipline (PS3)
- Make their reasoning clear, and constructively evaluate others' use of evidence (PS5)
- Actively seek to understand other perspectives and cultures (PS7)
- Communicate effectively with people of varied backgrounds (PS7)
- Evaluate other points of view critically and constructively (PS7)
- Prepare and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively (CCRA.SL.1)

Students who are *Participating and Contributing* in Mathematics:

- Understand the approaches of others to solving complex problems (MP1)
- Justify their conclusions, communicate them to others, and respond to the arguments of others (MP3)
- Explain a flaw in an argument (MP3)
- Listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments (MP3)
- Communicate precisely to others and use clear definitions in discussion with others and in their own reasoning (MP6)
- Give carefully formulated explanations to each other (MP6)

Students who are *Participating and Contributing* in Science and Engineering:

- Science: Ask questions of each other about the texts they read, the features of the phenomena they observe, and the conclusions they draw from their models or scientific investigations (P1, NRC)
- Collaborate with others to plan and carry out several different kinds of investigations (P3, NRC)
- Present data in a form that can reveal any patterns and relationships and that allows results to be communicated to others (P4, NRC)
- Construct explanations for the causes of phenomena (P6)
- Use argumentation to listen to, compare, and evaluate competing ideas and methods based on their merits (P7)
- Engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims (P7)

- Argue for the explanations they construct, defend their interpretations of the associated data, and advocate for the designs they propose (P7, NRC)
- Communicate information, evidence, and ideas [by] using tables, diagrams, graphs, models, interactive displays, and equations as well as orally, in writing, and through extended discussions (P8)
- Listen to, compare, and evaluate competing ideas and methods based on merits (P8)
- Engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims (P8)
- Communicate clearly and persuasively (P8)
- Reading in science requires an appreciation of the norms and conventions of the discipline of science, including understanding the nature of evidence used, an attention to precision and detail, and the capacity to make and assess intricate arguments, synthesize complex information, and follow detailed procedures and accounts of events and concepts (NGSS Font Matter)
- Writing and presenting information … to assert and defend claims in science, demonstrate what they know about a concept, and convey what they have experienced, imagined, thought, and learned (NGSS Font Matter)

MANAGING LEARNING

Students who are *Managing Learning* in English Language Arts:

- Become self-directed learners (PS1)
- Seek out and use resources to assist learning (PS1)
- Read purposefully and listen attentively (PS2)
- Set and adjust purpose for reading, writing, speaking, listening, and language use as warranted by the task (PS3)
- Tailor online searches to acquire useful information efficiently (PS6)
- Select and use technological tools and mediums best suited to their communication goals (PS6)
- Demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression (CCRA.L.6)[8]

Students who are *Managing Learning* in Mathematics:

- Monitor and evaluate progress and change course if necessary (MP1)
- Plan a solution pathway rather than simply jumping into a solution attempt (MP1)
- Continually ask, "Does this make sense?" (MP1)
- Persevere in solving problems (MP1)
- Explain to themselves the meaning of a problem and look for entry points to its solution (MP1)
- When solving a problem, maintain oversight of the process, while attending to the details (MP8)
- Continually evaluate the reasonableness of their intermediate results (MP8)

Students who are *Managing Learning* in Science and Engineering:

- Evaluate and refine models through an iterative cycle of comparing their predictions with the real world (P2)
- Identify sources of error in the investigations and calculate the degree of certainty in the results (P4)
- Develop own explanations of phenomena based on students' observations or student-developed models (P6, NRC)
- Refine design ideas based on the performance of a prototype or simulation (P6, NRC)
- Develop a sense of the process of argument necessary for advancing and defending a new idea or an explanation of a phenomenon and the norms for conducting such arguments (P7, NRC)
- Continually evaluate the reasonableness of their intermediate results (MP8)

[1] PS refers to Portrait of Students meeting the standards; and the number refers to the idea's order of appearance in the section of the CCSS document.

[2] CCRA refers to College and Career Readiness Anchor Standards; R refers to Reading; and the number refers to the standard number from which the text was excerpted.

[3] W refers to Writing.

[4] SL refers to Speaking and Listening.

[5] MP refers to the Math Practice standards; the number refers to the standard number from which the text was excerpted.

[6] P refers to NGSS Science and Engineering Practices from Appendices F & M; the number refers to the standard number from which the text was excerpted.

[7] NRC refers to A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, 2012.

[8] L refers to Language.

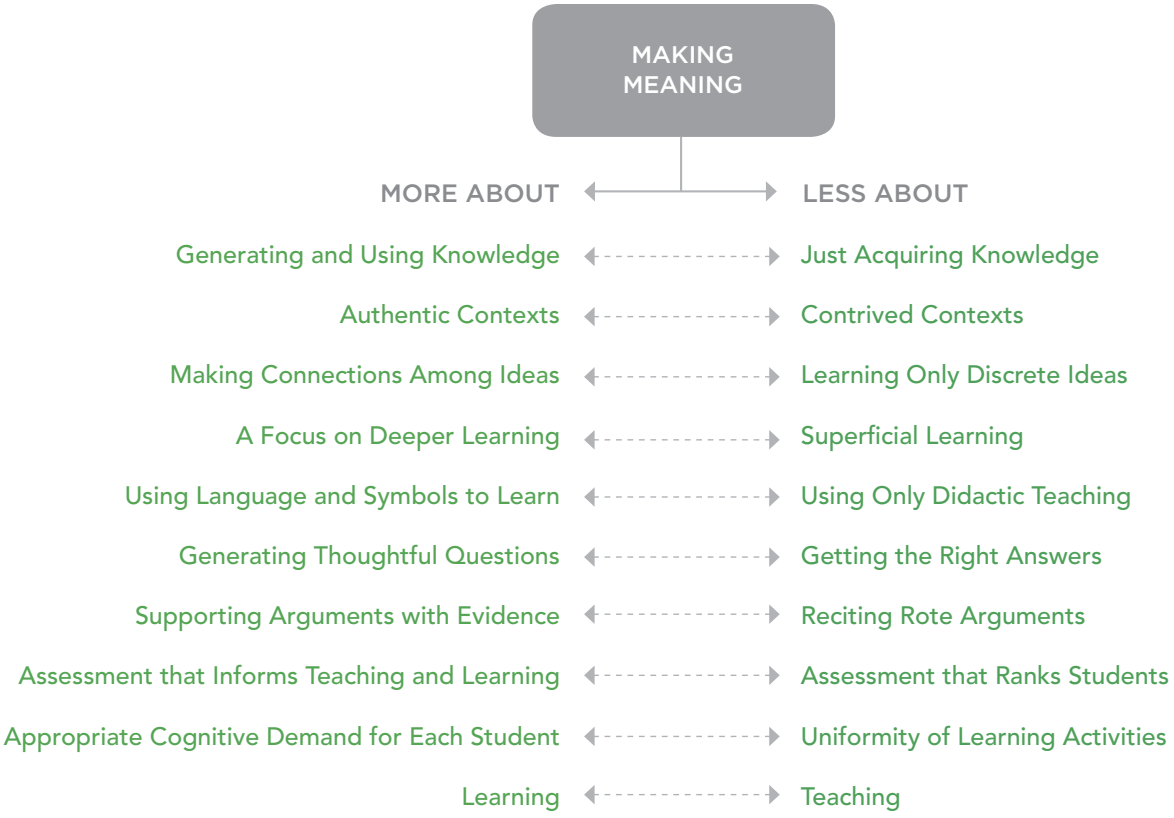
DISCUSSION TOOL

This tool is for use by teachers and by those who support teachers for reflection and discussion. The figures below represent a continuum of teacher practices. The left columns ("More About") reflect practices that embody principles from the Fundamentals of Learning. The right columns ("Less About") may occur in classrooms at any given time, but they should not be the main practices found in classrooms.

Derived from the Fundamentals of Learning, this discussion tool highlights the emphases needed in classroom practice to implement the CCRS effectively.

The purpose of this tool is for teacher self-reflection and is not intended to evaluate teaching practices. Here are some questions for you to think about as you use this tool:

- *Is my classroom practice consistent with the "more about" column?*
- *In what ways?*
- *How does it differ?*
- *What might I need to work on in preparation for implementing the CCRS?*




PARTICIPATING AND CONTRIBUTING
MORE ABOUT
LESS ABOUT
Decision-Making by Students and Teacher
Decision-Making Only by Teacher
Teacher- and Student-Initiated Learning
Entirely Teacher-Initiated Learning
Collaboration with Others
Exclusively Individual Learning
Valuing All Perspectives
Tolerating Other Perspectives
Thoughtful Responses
Race to the Answer
Teacher as Mediator or Participant in Conversations
Teacher as Lecturer
Relevant Content
Content Not Relevant to Students
Reflecting On and Learning from Mistakes
Avoiding Mistakes
Intellectual Curiosity and Risk-Taking
Rigid or Overly Scripted Lessons
MANAGING LEARNING
MORE ABOUT
LESS ABOUT
Learning to be a Life-Long Learner
Learning for the Here and Now
Developing the Capacity to Learn
Storing Existing Knowledge
Adapting to Unknown Situations
Focusing on Immediate Concerns
Students Recognizing Mastery/Success
Teacher Declaring Mastery/Success
Students Articulating their Learning Status
Teacher as the Sole Expert on What Students Know
Reflecting on Learning
"Checking a Box" and Moving On
Valuing Generative Struggle and Confusion
Avoiding Cognitive Struggle

FOL MENU

This FOL Menu includes all the FOL indicators listed in the "In Practice" section of this resource. This menu is intended to help teachers easily access the FOL indicators while they design or review lessons. The indicators are grouped together in the FOL Menu by: classroom culture, language, student, teacher, content, resource, and activity and task.

Classroom Culture

- Classroom culture focuses on learning
- Classroom culture generates inquiry and new ideas
- Classroom culture feels like a place where students have a say
- Classroom culture encourages questions, contributions, suggestions, and learning from mistakes and successes
- Classroom culture enables risk taking
- Classroom culture values every student's contribution
- Classroom culture embraces flexibility
- Classroom culture supports reflection
- Language is used in internal regulation

Language

- Language focuses attention on thinking in the content areas
- Language is used in extended discourse
- Language invites students to participate in learning
- Language reflects the routines and norms of the learning community
- Language is used for resolution of disagreements and acknowledgement
- Language is used for communicating intentions, for negotiation, and expressing learning processes

Students

- Students ask questions of themselves, the teacher, and others
- Students take time to think
- Students tackle real and interesting problems and devise solutions
- Students reason and justify thoughts
- Students discuss and explore ideas
- Students draw on personal knowledge and experience
- Students contribute to and benefit from the learning of others
- Students feel able to make suggestions
- Students gain insights from others' similarities and differences
- Students take an active role in the processes of learning
- Students give thoughtful, extended answers
- Students work in groups of different sizes and compositions and with various individuals
- Students cooperate and take the lead as appropriate in groups
- Students are interested in their learning
- Students are reflective about their own learning
- Students are (or become) confident in learning
- Students take risks
- Students learn from mistakes
- Students show perseverance in learning
- Students are resourceful about learning

Teachers

- Teacher makes connections between new and prior learning
- Teacher integrates assessment and instruction
- Teacher alters and adapt plans in response to learners
- Teacher revisits learning plans with students
- Teacher balances teaching approaches (didactic and student-initiated; practical and theoretical)
- Teacher allocates sufficient time for deep learning
- Teacher structures the classroom for participation
- Teacher engages in sustained discourse with students
- Teacher shows herself as a learner
- Teacher is a sensitive observer of her students
- Teacher is willing to make changes
- Teacher assists students to monitor their own learning
- Teacher provides feedback to students
- Teacher works collaboratively with colleagues

Content

- Content aligns to the CCRS
- Content draws on authentic contexts—related to things that are happening in the local and global community
- Content is comprehensible
- Content relates to students' existing knowledge and experience
- Content broadens and deepens students' learning
- Content is seen by students as relevant
- Content enables students to find personal expression
- Content sustains students' interest
- Content helps students make connections within and across standards
- Content meets students' present and prospective needs
- Content is (or becomes) interesting to students

Resources

- Resources come from a range of resources: local, national, and global
- Resources draw on diverse perspectives and forms of communication
- Resources include a range of media and representations
- Resources are sourced not only by teachers, but also by students, parents, community members, and others
- Resources encourage collaboration
- Resources are shared among students
- Resources are perceived as relevant and useful
- Resources expand students' approaches to learning

Activities and Tasks

- Activities and tasks take students into real, authentic contexts
- Activities and tasks are purposeful and worthwhile
- Activities and tasks have high cognitive demand for all students
- Activities and tasks lead to deep learning
- Activities and tasks engage students' interest
- Activities and tasks are for both individuals and groups
- Activities and tasks allow for differences
- Activities and tasks are flexible and adaptable
- Activities and tasks are dynamic—activities that lead to and generate other activities unforeseen
- Activities and tasks include student reflection

BACKGROUND READING

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