DEVELOPING AND REFINING LESSONS:

PLANNING LEARNING AND FORMATIVE ASSESSMENT FOR MATH COLLEGE AND CAREER READY STANDARDS

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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 all students, including students with disabilities, English learners, academically at-risk students, students living in extreme poverty, and gifted/talented students. The series of resources addresses key shifts in learning and teaching represented in the CCRS. This resource uses the Common Core State Standards (CCSS; National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010) as an example of CCRS. The processes described in this resource are applicable to all States' CCRS, including the CCSS. The content of this resource is drawn from leading theory and research about learning, teaching, and formative assessment. A section on background reading is included at the end.

Teachers who are familiar with the EQuIP rubrics developed by Achieve (2013) will notice several points of connection between this resource and the rubric for evaluating Mathematics Lessons and Units (see "Additional Resources" section for more information). The EQuIP rubrics were designed to help teachers evaluate the quality of instructional materials and may serve as criteria in developing these materials. This series of CSAI resources provides teachers with a process to create instructional materials that address all four dimensions of the EQuIP rubrics (i.e., alignment, key shifts, instructional supports, and assessment). The processes advocated here will help teachers meet the following criteria found in the EQuIP rubric:

- Develop content through reasoning about the new concepts on the basis of previous understandings.
- Provide students opportunities to independently apply mathematical concepts in real-world situations.
- Support teaching and learning of the targeted standards.
- Use and encourage precise and accurate academic language, terminology, and concrete or abstract representations.
- Provide appropriate level and type of scaffolding, differentiation, intervention, and support to a broad range of learners.
- Facilitate a mix of instructional approaches for a variety of learners.
- Design opportunities to elicit direct, observable evidence.
- Use formative assessment and self-assessment.

WHAT IS IN THIS RESOURCE

The purpose of this resource is to provide guidance for teachers in the design of daily lessons that support student learning of CCRS. Although it can be used in isolation, this resource draws on teacher learning and work from other resources in the CSAI series. Teachers are best prepared to use this resource if they are familiar with the Fundamentals of Learning[1] and the development of Learning Goals and Success Criteria.[2]

This resource is divided into four sections, each of which emphasizes the use of formative assessment in lesson planning and improvement.

(1) Key considerations in lesson planning with formative assessment are presented and discussed.

(2) A pair of tools is introduced to support teachers in lesson planning with formative assessment.

(3) The process of implementing formative assessment is discussed. Key features include eliciting evidence, interpreting evidence, responding to anticipated and unanticipated evidence, and providing feedback.

(4) Ways to use student evidence and teacher self-reflection to improve subsequent lessons are discussed.

The ideas presented in these sections are integrated into five planning tools: Lesson Planning with Formative Assessment, Lesson Hot Spots, Quick-Guide to the Fundamentals of Learning, Quick-Guide to the Deliberate Acts of Teaching, and Lesson Reflection. Printable versions of these tools are included at the end of the resource.

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[1] This model of student learning is discussed in detail in the CSAI resource *Fundamentals of Learning* (csai-online.org/resource/24).

[2] These components of formative assessment are discussed in detail in the CSAI resource *Building Blocks, Learning Goals, and Success Criteria: Planning Instruction and Formative Assessment for K-8 Math Standards* (csai-online.org/curriculumandinstruction).

LESSON PLANNING WITH FORMATIVE ASSESSMENT: THE PROCESS

Good teachers know the value of a well-planned lesson. And they appreciate that lesson planning is not a mundane enterprise. It is a complex, thoughtful process that enables teachers to carefully orchestrate the activities, participant structures, and interactions that will support student learning. Adequate lesson planning is critical to ensure that all students meet the learning goals of a lesson and move a bit further down the road towards college and career readiness.

Lesson planning starts with clear learning goals and criteria by which success on the learning goals will be judged. It also starts with an understanding of the prior learning on which these goals are built and a clear vision of where the goals will lead next. Once they have established the context and goals of the lesson, teachers then design teaching, learning, and assessment activities that will help students progress from where they are to where they need to be. As discussed below, these activities can be artfully designed both to engage students in learning *and* to provide evidence of their learning. In this way, teaching, learning, and formative assessment are seamlessly intertwined to support student success.

Research clearly shows that student learning is enriched through formative assessment, which should be purposely integrated into instructional planning. Formative assessment practices include:

(1) Creating learning/teaching progressions between and within standards;

(2) Establishing clear Learning Goals for the lesson and associated Success Criteria (what students will say, do, make or write to indicate that they have met the goal);

(3) Sharing Learning Goals and Success Criteria with students and making sure they understand what goals and criteria entail;

(4) Planning strategies to elicit evidence of learning during the lesson (what students will say, do, make or write); *(Note: Any Evidence Gathering Strategies need to be aligned to the Learning Goals and Success Criteria. Quality instructional tasks, designed to build students' thinking, can reveal substantive insights into how their thinking is developing – in effect, the instructional task and the assessment task are one and the same.)*

(5) Interpreting the evidence in real-time or as close to the actual time of the lesson as possible to make judgments about where students are in relation to the lesson Learning Goals;

(6) Deciding on appropriate pedagogical action to move students' learning closer to the desired goals. Possible pedagogical actions include: continuing with the planned lesson; providing feedback that gives students hints or cues about steps they can take; or purposefully departing from the planned lesson in response to the current levels of students' understanding;

(7) Involving students in the process through Peer and Self-Assessment.

PRIOR KNOWLEDGE, LEARNING GOALS, AND SUCCESS CRITERIA

Two very basic questions teachers need to ask as they approach lesson planning with formative assessment are, *Where are my students starting?* and *Where do they need to go?*

- **Where are my students starting?** The importance of connecting students' prior knowledge and experience to new learning is well documented in the research literature. This includes prior academic learning, knowledge that learners acquire outside of school settings (such as in the home or community), as well as misconceptions that a student may bring to new learning.

  To leverage prior knowledge and experience, teachers think carefully about the entry points of a lesson, or the different ways that students will begin to access the lesson content. As diverse learners, students in any classroom will have different levels and kinds of prior knowledge and experience. For this reason, teachers consider the background of their students and the specific goals of a lesson, and then purposefully plan a variety of appropriate entry points into the lesson.

- **Where do they need to go?** Learning Goals and Success Criteria are discussed extensively in the CSAI resource, *Building Blocks, Learning Goals, and Success Criteria*, and teachers are encouraged to consult this resource for a more thorough explanation of how to develop them from CCRS. In short, Learning Goals describe what students will learn (not what they will do) during a lesson; Success Criteria are derived from Learning Goals, but they are more specific. They describe explicit performances of understanding or skills – what students will say, do, make, or write – to demonstrate that they have met the Learning Goals.

LESSON PLANNING WITH FORMATIVE ASSESSMENT: SIX KEY CONSIDERATIONS IN PLANNING LEARNING EXPERIENCES

After establishing where students are and where they need to go, teachers plan a sequence of learning experiences to help students progress towards the lesson's Learning Goals. Within these learning experiences, teachers embed formative assessment opportunities to elicit and respond to evidence of student learning during the course of instruction. Below are six key considerations in planning learning experiences.

1. THE FUNDAMENTALS OF LEARNING

The Fundamentals of Learning (FOLs) are the means through which students achieve CCRS during their daily learning opportunities in the classroom. In planning lessons to meet the CCRS, teachers should incorporate the FOLs and consider how they will be reflected in the learning activities, the resources provided, the language used, the collaborative situations for student learning, and the overall climate of the classroom.

The FOLs are organized in three broad categories and described below.[3]

- **Meaning Making.** This is the process of making sense of information, experiences, and ideas through the use of creative, critical, and metacognitive thinking skills. 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.

- **Participating and Contributing.** Engaging with others in learning involves working cooperatively to acquire information, share and discuss ideas and interpretations, and obtain feedback. 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. Through thoughtful, extended discourse; by making suggestions; and by expressing their opinions and understanding, students actively participate in their own learning and the learning of others.

- **Managing Learning.** This learning fundamental is about 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 their learning are resourceful and resilient, and they gain satisfaction from persevering to meet the high expectations they set for themselves.

Each FOL encompasses unique components, reflecting different aspects of student learning. A tool ("Quick-Guide to the Fundamentals of Learning") is included at the end of this resource to help teachers think about how to incorporate the FOLs into their lessons: as teachers design their students' learning experiences, they can consult this tool for inspiration or to check whether the FOLs have been adequately enacted in the lesson.

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[3] For more detailed information on each, as well as a description of the overall FOL framework, refer to the CSAI resource, *Fundamentals of Learning* (csai-online.org/resource/24).

2. PARTICIPANT STRUCTURES

Because student discourse is a means to support learning and a source of evidence about how that learning is developing, participant structures are an essential component of lesson planning. These structures can support student involvement in whole group, small group, or pair discourse. The selection of a particular participant structure should be motivated by the questions, *What evidence of student understanding will this structure generate?* and *What student learning will be enabled by this structure?*

3. ANTICIPATED CHALLENGES AND RESPONSES

It is critical that teachers anticipate ways that students might respond at different points in the lesson. Teachers ask, *What are common challenges or misconceptions that arise in the teaching of this content and how will I support students at those points in the lesson?* Teachers also think about the evolution of possible student responses corresponding to different levels of comprehension. They ask, *What might an emerging understanding look and sound like? A developing understanding? A secure understanding?* They then consider how they will support students at these points in the lesson.

4. LANGUAGE DEMANDS AND OPPORTUNITIES

Because the CCRS emphasize effective communication and collaboration, teachers plan and teach their lessons to engage students in language learning opportunities; four areas of opportunity are described below.

- **Subject-Area Discourse Practices.** Discourse practices within a subject area are the characteristic ways that speakers use language to communicate: to reason, explain, argue, and perform tasks. In mathematics, for example, discourse often includes language activities like abstracting, generalizing, making and supporting claims, and describing patterns. Discourse in ELA may include language activities such as summarizing, critiquing, or justifying. It is important that students have adequate opportunities to observe and practice distinct forms of discourse associated with different disciplines.

- **Registers.** Generally, *register* is used to refer to the kind of language used in a variety of settings. For example, the register that students employ when discussing homework at the dinner table is different from the register they use in the presentation of results from their science investigation. It is important that students have opportunities to communicate in both formal and informal registers, in order to gain skills in using language appropriate to context.

- **Vocabulary (Subject-Specific or General Academic).** Research indicates that students learn new vocabulary best when it is contextualized in a meaningful way. When vocabulary instruction is embedded within content instruction, teachers help students acquire the vocabulary necessary to understand and express academic content.

- **Language Growth Through Subject-Area Learning (For ELs and Others).** Just as vocabulary is best learned in context, other dimensions of language development (i.e., syntax and discourse) occur in the context of subject-area learning. Both English Learners (ELs) and native English-speakers learn language as they engage in meaningful, content-rich activities that involve discussion, investigation, and co-construction of academic products. In order to facilitate this embedded language learning, teachers should give students opportunities to use a wide variety of linguistic resources (including home language, everyday language, and emergent English) as they engage deeply with subject-area learning.

5. EVIDENCE GATHERING

A key part of lesson planning is the integration of Evidence Gathering strategies into teaching and learning. As teachers create lesson plans, it is important that they consider how teaching and learning activities they plan can also provide opportunities to obtain evidence of student learning during the course of the lesson. Such opportunities may arise during teacher-student interactions, during peer interactions, and from examining student work products. The learning experiences in which students are engaged can provide evidence of their learning. Evidence of students' learning status during the lesson can be elicited using the following strategies (Chang & Jones, 2014;[4] Heritage, 2013):

- **Tasks.** High quality instructional tasks, well aligned with Learning Goals and designed to stimulate students' thinking, can reveal substantive insights into how student thinking is developing. It is not enough to check if students can recall basic knowledge and procedures but rather tasks should help teachers determine if students can apply their knowledge, reason, develop arguments and counter arguments, and so on.

- **Observations.** Although student work products can provide solid evidence of student learning, observations of student interactions during instruction also can reveal misconceptions, confusions, or fragmentary understanding. Observations also show how students negotiate meaning, manage their behavior and emotions, take responsibility, use different strategies or change strategies with new evidence, or collaborate with others. These attributes of learning are best assessed through teacher observation as students are working on complex and engaging tasks.

- **Questioning.** Teacher questions can be designed to provide evidence of student thinking relative to lesson learning goals. Questions should elicit evidence of student learning to find the gaps between what students know and what they need to know. Questions should probe the "how" and "why" of student understanding, rather than just focusing on "what" students know. Questions can encourage students to explain their reasoning and how they arrived at solutions, decisions, and opinions.

- **Discussion.** Rich discussions between a teacher and students, or between and among students, can serve to externalize students' thinking, such as the ways in which they have processed a given task, the strategies they have employed to solve complex problems, or their use of logic and evidence to support or refute a claim.

6. PEER AND SELF-ASSESSMENT

To successfully engage in peer assessment, students need to understand the Learning Goal and Success Criteria – "the reference level being aimed for" (Sadler, 1989, p. 121). In addition to having clear criteria, students need to be taught to evaluate the work of others and offer constructive advice to their peers. Teachers need to plan opportunities during the lesson for peer assessment.

Peer assessment is a useful way to help students engage in self-assessment. When students are involved in self-assessment, they can develop the skills of metacognition – thinking about their thinking – and self-regulation. Self-regulated learners monitor their learning, compare it to specific criteria, and then make adaptations to their learning strategies when they deem it necessary. Self- assessment needs to be taught and opportunities for self-assessment should be integrated into classroom routines as part of the formative assessment process.

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[4] The following bulleted text is excerpted and adapted with permission from the authors. See the "References and Background Materials" section for more information.

LESSON PLANNING WITH FORMATIVE ASSESSMENT: A PAIR OF TOOLS FOR TEACHERS

The previous sections provided an overview of the lesson planning process with formative assessment and highlighted six things teachers should consider as they plan learning experiences. This section presents a pair of tools to help teachers integrate formative assessment into their lessons. These tools were designed to be used in tandem, and teachers might find it helpful to think of them in terms of producing a play.

The left column of the first tool, "Lesson Planning with Formative Assessment," can be thought of as "the screenplay of the lesson." It covers *who* will be doing *what*, *with whom*, and *when*. The remainder of this tool and the second tool, "Lesson Hotspots" can be thought of as the supporting information: characters' motivations, the backstory, and the contingency plans – all the material that is necessary to answer the *whys*, *hows*, and *what-ifs* of the lesson. In the same way that a playwright might develop the screenplay and the supporting information simultaneously, teachers will likely fill in these tools at the same time, moving back and forth between the two documents. Thinking about the pair of tools in this way clarifies how they complement each other and why neither is sufficient on its own.

Both of the tools are previewed in miniature on the following pages and have been annotated with the key topics of the previous section (e.g., Evidence Gathering, Language Demands and Opportunities, etc.). This snapshot gives teachers a sense of how these key topics have been organized for lesson planning purposes. At the end of this resource, teachers will find full-size, printable versions of the tools, as well as filled-in examples of the tools, based on a sample lesson from Grade 3.

LESSON PLANNING WITH FORMATIVE ASSESSMENT

Learning Goals.
For more information, see page 5.

Success Criteria.
For more information, see page 5.

Title of Lesson: _____ CCRS: _____

Learning Goals: _____ Success Criteria: _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Evidence Gathering. For more information, see page 9.

LEARNING EXPERIENCES	PARTICIPANT STRUCTURES				WHAT EVIDENCE AM I GATHERING?	PEER ASSESSMENT	SELF-ASSESSMENT
Consider: • *Fundamental of Learning* • *Lesson Hot Spots* • *Practice Standards (for Math)*	WHOLE GROUP	SMALL GROUP	PAIRS	INDIVIDUAL	*Consider:* • *Tasks* • *Observations* • *Questioning* • *Discussion*		

Participant Structures. For more information, see page 8.

Peer and Self-Assessment. For more information, see page 9.

Learning Experiences. Here, teachers synthesize the key concepts discussed in the preceding pages to plan the flow of the lesson. They make sure that learning experiences both support student learning and facilitate evidence gathering. These experiences should reflect the FOLs, Lesson Hot Spots (from the companion tool on the next page), and Math Practice Standards (for teacher who teach from such standards).

LESSON HOT SPOTS

Levels of Prior Knowledge/Experience. For more information, see page 6.

Anticipated Responses. For more information, see page 8.

Anticipated Challenges. For more information, see page 8.

Title of Lesson: _____

CCRS: _____

Levels of Prior Knowledge/Experience	How will student be supported?

Anticipated Responses (Emerging, Developing, or Secure)	How will student be supported?

Anticipated Challenges	How will student be supported?

LESSON HOT SPOTS (CONTINUED)

Language Demands and Opportunities. For more information, see page 8.

Language Demands and Opportunities	How will student be supported?
Subject-Area Discourse Practices	
Registers	
Vocabulary (Subject-Specific or General Academic)	
Language Growth Through Subject-Area Learning (For ELs and Others)	

FORMATIVE ASSESSMENT IN ACTION

Thus far, this resource has laid out what will be a highly interactive process of teaching and learning that purposively uses evidence to propel students forward. Two planning tools to help teachers prepare for this interactive process have been introduced. This section discusses the real-time use of evidence that teachers gather during the course of the lesson.

INTERPRETING AND RESPONDING TO EVIDENCE

As teachers gather evidence of student understanding during the course of the lesson, they interpret the evidence, drawing inferences about student learning in relation to the intended Learning Goal(s). Such inferences might be that students have an emerging understanding of the concept or that their understanding is more developed and closer to the goal. It may be that there are student misconceptions that need to be addressed. Teachers may also infer that the goal has been met.

Clearly, teachers cannot anticipate exactly how a lesson will play out. Based on their content knowledge and prior teaching experience, however, and using the pair of tools introduced in the previous section, teachers can anticipate and plan supports for a variety of student responses.

PEDAGOGICAL ACTION

After teachers have interpreted the evidence and made a determination about the status of student learning, they need to take some action in response to students' immediate learning needs. This action might be taken in the moment in the form of feedback to the student(s) or an instructional adjustment. Or it may be that the teacher uses the information to plan the next lesson. Teachers might also decide that student learning is on track to meet the Learning Goal and so they may continue with the lesson as planned.

Below are some guidelines for effective feedback in response to the evidence obtained. Feedback should:

- Be related to Learning Goals and Success Criteria;

- Be specific and clear;

- Provide suggestions, hints, or cues rather than correct answers;

- Engage students cognitively in the task.

Instructional adjustments could include: modeling, prompting, questioning, giving feedback, telling, explaining, and directing. These instructional moves have been described as "Deliberate Acts of Teaching,"[5] and a one-page "quick-guide" for teachers that lists and explains these moves is included in the back of this resource ("Quick-Guide to the Deliberate Acts of Teaching").

Not only do teachers make pedagogical choices on-the-fly in the course of a lesson, they also plan them ahead of time as strategies to support student learning. As such, Deliberate Acts of Teaching might be integrated into lesson plans using the "Lesson Hot Spots" tool (in the field, "How will students be supported?").

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[5] Content on *Deliberate Acts of Teaching* is adapted with permission from the New Zealand Ministry of Education. For more information, see http://literacyonline.tki. org.nz/Literacy-Online/Teacher-needs/Pedagogy/Deliberate-acts-of-teaching

WHAT'S NEXT?

The formative use of data doesn't stop at the end of a lesson. Teachers use the evidence they collected and their experience with the lesson for subsequent planning.

MOVING FORWARD WITH EVIDENCE

Teachers also use the evidence of student learning that they gathered during the lesson after the lesson in order to plan subsequent teaching and learning. Teachers ask, *Is further instruction in support of the same Learning Goal necessary?* and *Is student understanding secure, so that the next lesson should address the next Learning Goal?* Note that these questions may be answered differently for different students.

In a sense, the learning of one lesson becomes the starting point of the next lesson; a clear picture of student understanding through formative assessment is crucial to this continuity.

A TOOL FOR REFLECTING ON PRACTICE

Reflecting on one's practice is a central component of professional growth. Included at the end of this resource is a tool that makes further use of evidence gathered during a lesson, this time to reflect upon and improve instruction. The "Lesson Reflection" consists of a set of guiding questions that teachers use when "debriefing" a lesson, in order to determine whether their lesson successfully incorporated one or more of the concepts presented in this resource. The assumption is not that teachers will debrief every feature, of every lesson, every day, but rather that teachers will identify the lesson feature(s) they would like to review and improve, and use the "Lesson Reflection" tool to do so.

TOOLS AND EXEMPLARS

QUICK-GUIDES

QUICK-GUIDE TO THE FUNDAMENTALS OF LEARNING

This one-page "quick-guide" summarizes key dimensions of the Fundamentals of Learning. Teachers can use this tool to ensure that the Fundamentals are reflected in the learning activities, resources, language, collaborative situations, and overall climate of the classroom.

QUICK-GUIDE TO THE DELIBERATE ACTS OF TEACHING

This one-page "quick-guide" lists and explains several instructional moves that teachers may plan for ahead of time or decide to make on-the-fly during the course of the lesson.

COMPLETED EXAMPLES

LESSON PLANNING WITH FORMATIVE ASSESSMENT: GRADE 3

This example illustrates how a Grade 3 teacher uses this tool to plan for the sample lesson, "Repeated Addition with Manipulatives and Number Sentences." The tool helps the teacher integrate key elements of formative assessment into the lesson, including Learning Goals, Success Criteria, peer and self-assessment, and a variety of participant structures to facilitate evidence gathering.
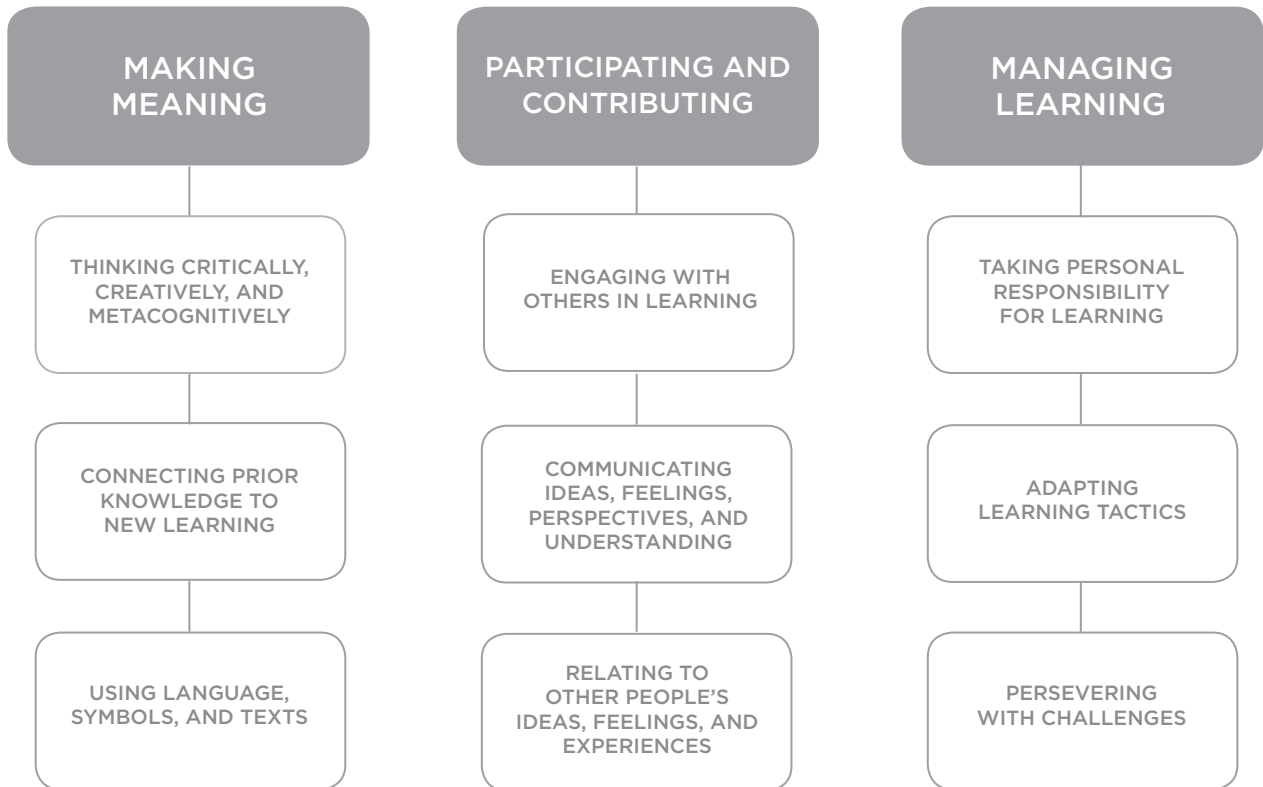
LESSON HOT SPOTS: GRADE 3

This example illustrates how a Grade 3 teacher uses this tool to plan for the sample lesson, "Repeated Addition with Manipulatives and Number Sentences." The tool helps the teacher integrate key elements of formative assessment into the lesson, including prior knowledge and experience, anticipated challenges and responses, and language demands and opportunities.

Quick-Guide to the Fundamentals of Learning

Created by CRESST, UCLA, 2014

MAKING MEANING	PARTICIPATING AND CONTRIBUTING	MANAGING LEARNING
THINKING CRITICALLY, CREATIVELY, AND METACOGNITIVELY	ENGAGING WITH OTHERS IN LEARNING	TAKING PERSONAL RESPONSIBILITY FOR LEARNING
CONNECTING PRIOR KNOWLEDGE TO NEW LEARNING	COMMUNICATING IDEAS, FEELINGS, PERSPECTIVES, AND UNDERSTANDING	ADAPTING LEARNING TACTICS
USING LANGUAGE, SYMBOLS, AND TEXTS	RELATING TO OTHER PEOPLE'S IDEAS, FEELINGS, AND EXPERIENCES	PERSEVERING WITH CHALLENGES

Quick-Guide to the Deliberate Acts of Teaching

Modeling. Nearly everything a teacher does during the course of a lesson can be seen as modeling, but deliberate, purposeful modeling is a powerful instructional strategy. For example, teachers can make intended student learning "visible" by verbalizing their reasoning out loud, explicitly narrating their thinking during a problem-solving process, or demonstrating a specific skill.

Prompting. Prompting is an instructional strategy the teachers use to help students access and apply prior learning as a bridge to new learning. In order to prompt effectively, a teacher needs a detailed knowledge of the student's current level of understanding. Prompting may take the form of a reminder, a strong hint, a clue, or a question, and should always followed by adequate wait time.

Questioning. Asking questions is an ideal way to generate thoughtful discussions and explorations of issues that are important to developing students' understanding. In addition, attending to the answers that students give and probing these answers with follow-up questions yields important information that teachers can use to evaluate current levels of understanding and identify appropriate instructional responses for next steps.

Giving Feedback. The primary use of feedback is not to indicate whether students are right or wrong but to enable them to reflect on their use of strategies and on their learning. An important message for teachers to convey when giving feedback is that the source of student success is their own learning strategies. Providing feedback that gives hints, cues, or suggestions rather than total solutions will assist students to build a repertoire of learning strategies.

Telling. Telling means supplying what students need in the moment (an unknown word or the steps to complete a task, for example) to enable them to maintain momentum in the learning process. A teacher makes a professional judgment to use this instructional strategy so that student learning is not short-circuited but rather so that temporary obstacles are removed on the way to deeper learning.

Explaining. Explanations are verbally explicit, tailored to individual student needs, and intended to help students develop their own understandings. Teachers may use explanations to introduce an unfamiliar concept, clear up misconceptions, explain a process (how to give peer feedback, for example), or clarify the steps of a specific learning strategy (such as note-taking).

Directing. Directing is simply giving a specific instruction to let the learner know what he or she is supposed to do. For example, "find the sentence in the text that suggests …," "write the letter for the sound …," or "turn to your partner and share …"

Lesson Planning with Formative Assessment

Created by CRESST, UCLA, 2014

Title of Lesson: Repeated Addition with Manipulatives and Number Sentences   **CCRS:** CCSS.MATH.CONTENT.3.OA.1

Learning Goals: _____

_____

_____

_____

_____

_____

_____

_____

_____

Success Criteria: Write a correct number sentence from a given concrete representation of repeated addition. Accurately explain the correspondence between their number sentence and the given representation. Correctly model a given number sentence about repeated addition with a concrete representation. Accurately explain the correspondence between their concrete representation and the given number sentence.

LEARNING EXPERIENCES Consider: • Fundamental of Learning • Lesson Hot Spots • Practice Standards (for Math)	PARTICIPANT STRUCTURES				WHAT EVIDENCE AM I GATHERING? Consider: • Tasks • Observations • Questioning • Discussion	PEER ASSESSMENT	SELF-ASSESSMENT
	WHOLE GROUP	SMALL GROUP	PAIRS	INDIVIDUAL			
Lesson Opening (~15 minutes) review yesterday's learning, connect it to today's learning share Learning Goals and Success Criteria use manipulative kits and whiteboards to model and explain the relationship between symbolic and concrete representations students explain relationship between symbolic and concrete representations to peers and group monitor, question, give feedback, and explain as necessary reinforce mathematical language: "four groups of two" and "four repeats of two"	X	X	X		Lesson Opening students' peer and group explanations provide evidence of their level of understanding of the relationship between symbolic and concrete representations students' work with manipulatives and whiteboards provides evidence of their precision and accuracy in toggling between the two representations	X	

LEARNING EXPERIENCES Consider: • Fundamental of Learning • Lesson Hot Spots • Practice Standards (for Math)	PARTICIPANT STRUCTURES				WHAT EVIDENCE AM I GATHERING? Consider: • Tasks • Observations • Questioning • Discussion	PEER ASSESSMENT	SELF-ASSESSMENT
	WHOLE GROUP	SMALL GROUP	PAIRS	INDIVIDUAL			
Partner Work (~15 minutes) students work in pairs, taking turns toggling between symbolic and concrete representations and explaining their reasoning to their partner circulate to observe work, listen to student explanations, and respond to various levels of student understanding (e.g., provide feedback, intervene to clarify, ask questions)			X		Partner Work students' partner work and explanations provide evidence of their level of understanding of the relationship between symbolic and concrete representations	X	
Whole class Game (~10 minutes) show a representation (array or number sentence) students use individual whiteboards to respond with the alternative representation get a "snapshot" of class understanding and make note of this for lesson closing and subsequent lesson(s)	X				Whole class Game students' whiteboard responses provide evidence of their precision and accuracy in toggling between the two representations		
Lesson Closing (~15 minutes) based on "snapshot," discuss important examples (e.g., "why do you think x, y, and z chose to represent the array this way?" or "how is this number sentence different from that one?") students reflect on the learning of the day, share what was easy/difficult, and record their "next steps" in their personal math journals	X				Lesson Closing students' responses during whole-group discussion provide evidence of their level of understanding of the relationship between symbolic and concrete representations students' self-assessment provides evidence about their level of confidence in the learning of the lesson		X

Lesson Hot Spots: Grade 3

Created by CRESST, UCLA, 2014

Title of Lesson: _Repeated Addition with Manipulatives and Number Sentences_

CCRS: _CCSS.MATH.CONTENT.3.OA.1_

Levels of Prior Knowledge/Experience	How will student be supported?
Students may have emerging (i.e., incomplete) knowledge of addition facts.	If appropriate, pair students with other students who can support them (i.e., cross-skill level pairing) during partner work, or provide students
Students may have trouble arranging objects into equal groups and arrays with accuracy.	Give students tools (e.g., grid paper, manipulative frames) to help them arrange objects into arrays.

Anticipated Responses (Emerging, Developing, or Secure)	How will student be supported?
(Developing) Students may be able to represent arrays as number sentences and vice versa, but have difficulty explaining their rationale.	Group students displaying this level of understanding and, in a mini-lesson, model (via think-aloud) the chain of reasoning behind moving between manipulatives and number sentences. Students will explain to peers and critiques others' explanations.
(Secure) Students may already understand the relationship between number sentences and concrete representations of repeated addition.	Pair students with other students who need support (i.e., cross-skill level pairing) during partner work.

Anticipated Challenges	How will student be supported?
Students may confuse "number in a group" with "number of groups."	Provide opportunities for additional practice with concrete representations, while focusing on and reinforcing consistent language use. If appropriate, strategically encourage peer-to-peer explanations.
Students may have difficulty using precise language in their explanations.	Model basic reasoning structure for translation between symbolic and concrete representation (e.g., "I have 4 groups of 2 objects, and so I need to write the number 2, 4 times").

Language Demands and Opportunities	How will student be supported?
Subject-Area Discourse Practices	The prominent discourse practices for this lesson are related to explanation and pattern recognition. Reinforce the mathematical reasoning behind the lesson by modeling sentences like, "I have 4 groups of 2 objects, and so I need to write _____" or "I see the number 2, 4 times, and so I need to arrange _____." When appropriate, point out the discourse connectors and their function (e.g., and, so, need to).
Registers	Students will have opportunities to practice providing mathematical explanations throughout the lesson.
Vocabulary (Subject-Specific or General Academic)	Explicitly introduce, focus on, and reinforce the following vocabulary: number sentence, addend, repeats/copies, group, row, array.
Language Growth Through Subject-Area Learning (For ELs and Others)	Provide students with many opportunities to explain the relationship between number sentences and concrete representations. Have students make these explanations in a variety of participant structures: pairs, small groups, whole group.

ADDITIONAL RESOURCES

The following resources contain a variety of information to help teachers plan learning and formative assessment for math CCRS.

EQuIP RUBRICS AND EXEMPLAR LESSONS FROM ACHIEVE
http://www.achieve.org/EQuIP

Achieve is a nonprofit education reform organization that works with states around academic standards, graduation requirements, assessments, and accountability. The organization has played a central role in the development of the Common Core State Standards and the Next Generation Science Standards. By following the link above, teachers can access a variety of free educational materials, including:

- "EQuIP" (Educators Evaluating the Quality of Instructional Products) rubrics that are used to evaluate the quality of existing instructional resources, and

- "EQuIP" exemplar lessons, which have been carefully vetted for quality and alignment to the cognitive demands of the CCSS.

DO THE MATH: COGNITIVE DEMAND MAKES A DIFFERENCE, AERA
http://www.aera.net/Portals/38/docs/Publications/Do%20the%20Math.pdf

This research brief emphasizes the importance of high-quality mathematics instruction *for all students*, not just those on trajectories towards careers in STEM fields. In particular, it concludes that all students should have access to cognitively demanding mathematics instruction, and this access must occur at two levels: curriculum policy and classroom instruction. Relevant research on course design and selection is summarized for policy makers, state and district officials, and school-level administrators, and the effects of tracking on student achievement are discussed. Additionally, the brief calls for elevated thinking in mathematics classrooms, including an emphasis on concepts and connections between concepts, as well as a focus on student articulation of reasoning and strategy, both of which are central themes in CCRS.

NATIONAL EDUCATION ASSOCIATION: COMMON CORE STATE STANDARDS
http://www.nea.org/home/46653.htm

The National Education Association (NEA) is the nation's largest professional employee organization. NEA is committed to advancing the cause of public education, and its members work at every level of education. NEA's Common Core State Standards website provides information to prepare educators to implement the Standards, including the *Common Core State Standards Toolkit*, a document that has updated links to many websites and resources.

PRINCIPLES AND GUIDELINES FOR EQUITABLE MATHEMATICS TEACHING PRACTICES AND MATERIALS FOR ENGLISH LANGUAGE LEARNERS, BY JUDIT MOSCHKOVICH

http://ed-osprey.gsu.edu/ojs/index.php/JUME/article/view/204

In this essay, the author describes principles for equitable mathematics teaching practices for English Language Learners (ELLs) and outlines guidelines for materials to support such practices. Although research cannot provide a recipe for equitable teaching practices for ELLs, teachers, educators, and administrators can use this set of research-based principles and guidelines to design equitable mathematics instruction, developing their own approaches to supporting equitable practices in mathematics classrooms. The recommendations presented use a complex view of mathematical language as not only specialized vocabulary but also as extended discourse that includes syntax, organization, the mathematics register, and discourse practices. The principles and guidelines stress the importance of creating learning environments that support all students (but specifically those learning English) in engaging in rich mathematical activity and discussions.

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STUDENT ACHIEVEMENT PARTNERS

http://www.achievethecore.org/

Founded by three of the contributing authors of the Common Core State Standards, Student Achievement Partners supports effective, innovative implementation of the Standards, with the goal of accelerating achievement for all students. The organization brings together educators and researchers to develop evidence-based practices and tools that are made openly available at no cost to states, districts, schools, and teachers, who are encouraged to take these resources and make them their own.

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UNDERSTANDING LANGUAGE: SUPPORTING ELLS IN MATHEMATICS

http://ell.stanford.edu/teaching_resources/math

Understanding Language, centered at Stanford University's Graduate School of Education, develops knowledge and resources that help content-area teachers meet English Language Learners' language needs in the context of the Common Core State Standards and Next Generation Science Standards. In particular for mathematics, the Understanding Language group has developed materials to illustrate how CCSS-aligned math tasks can be used to support math instruction and language development for ELLs at three grade spans (elementary, middle, and high school).

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THE NEW ZEALAND CURRICULUM ONLINE

http://nzcurriculum.tki.org.nz/

This website, maintained by the New Zealand Ministry of Education, contains a variety of resources for teachers, parents, and administrators. Curricular resources are available, as well as information on pedagogy and instruction, standards, professional development, community involvement, child and adolescent development, and language acquisition.

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TEMPLATES

The following templates are provided for teachers to print and fill in as they plan learning and formative assessment for College and Career Readiness Standards.

LESSON PLANNING WITH FORMATIVE ASSESSMENT

Teachers use this tool to plan the learning experiences and evidence gathering strategies that will support student learning and formative assessment. This tool is designed to be used in tandem with the "Lesson Hot Spots" tool (below).

LESSON HOT SPOTS

This tool is designed to be used in tandem with the "Lesson Planning with Formative Assessment" tool (above). Teachers use this tool to record and plan for varying levels of prior knowledge and experience, potential student challenges and responses, and language demands and opportunities.

LESSON REFLECTION

Teachers use this tool after the completion of a lesson in order to consider various features of the lesson and plan for future improvement.

Lesson Planning with Formative Assessment

Created by CRESST, UCLA, 2014

Title of Lesson: _____   CCRS: _____

Learning Goals: _____   Success Criteria: _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____

LEARNING EXPERIENCES *Consider:* • Fundamental of Learning • Lesson Hot Spots • Practice Standards (for Math)	PARTICIPANT STRUCTURES				WHAT EVIDENCE AM I GATHERING? *Consider:* • Tasks • Observations • Questioning • Discussion	PEER ASSESSMENT	SELF-ASSESSMENT
	WHOLE GROUP	SMALL GROUP	PAIRS	INDIVIDUAL			

LEARNING EXPERIENCES	PARTICIPANT STRUCTURES				WHAT EVIDENCE AM I GATHERING?	PEER ASSESSMENT	SELF-ASSESSMENT
Consider: • *Fundamental of Learning* • *Lesson Hot Spots* • *Practice Standards (for Math)*	WHOLE GROUP	SMALL GROUP	PAIRS	INDIVIDUAL	*Consider:* • *Tasks* • *Observations* • *Questioning* • *Discussion*		

Lesson Hot Spots

Created by CRESST, UCLA, 2014

Levels of Prior Knowledge/Experience	How will student be supported?

Anticipated Responses (Emerging, Developing, or Secure)	How will student be supported?

Anticipated Challenges	How will student be supported?

Language Demands and Opportunities	How will student be supported?
Subject-Area Discourse Practices	
Registers	
Vocabulary (Subject-Specific or General Academic)	
Language Growth Through Subject-Area Learning (For ELs and Others)	

Lesson Reflection

Created by CRESST, UCLA, 2014

Title of Lesson: _____

Lesson Feature	Guiding Questions	Response
CCRS Addressed in the Lesson	Did the lesson move students closer to achieving the standards I intended to address in the lesson? If not, how can I modify the learning goals, instruction, or design of the lesson?	
Fundamentals of Learning	Did this lesson facilitate Meaning Making, Participating and Contributing, and Managing Learning in the way that I wanted it to? If not, how can I better incorporate the FOLs?	
Levels of Prior Knowledge and Experience	Was the lesson sensitive to varying levels of prior knowledge and experience? If not, how can I plan differently for these lesson Hotspots?	
Anticipated Challenges	Did I adequately anticipate and support students at challenging points in the lesson? If not, how can I plan differently for these lesson Hotspots?	
Anticipated Responses	Did the student responses I anticipated and the supports I planned prepare me for what happened during the lesson? If not, how can I better plan for student responses and supports?	
Language Opportunities and Demands	Did the lesson provide adequate opportunities for students to practice subject-area language and use language in their learning process? If not, how can better incorporate language opportunities?	
Formative Assessment Planning	Do I have a clear picture of my students' level of understanding? If not, how can I modify my formative assessment strategies?	
Participant Structures	Did the variety of Participant Structures in which my students engaged enable the learning and evidence gathering that I intended? If not, how can I design these structures differently?	
Peer and Self-Assessment	Did my students have opportunities and support to assess themselves and their peers? If not, how can I better plan for these learning activities?	