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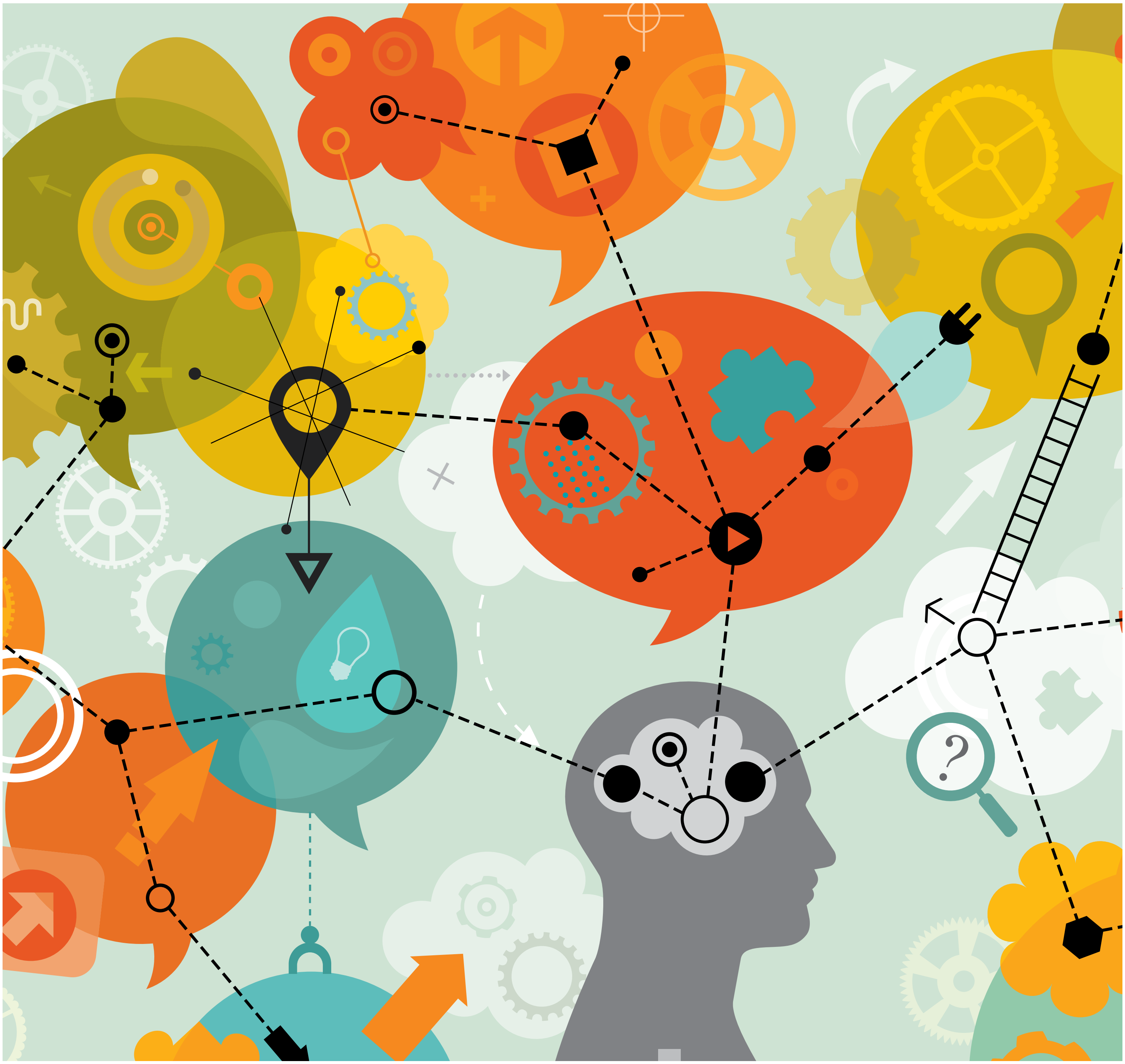
Student Learning That Works

How brain science informs a student learning model

By Bryan Goodwin



About the Author

Bryan Goodwin, president and CEO of McREL, thrives on translating research into practice, scanning the world for new insights and best practices on teaching and leading, and helping educators everywhere adapt them to address their own challenges. A frequent conference presenter, he is also the author of *Simply Better: Doing What Matters Most to Change the Odds for Student Success,* and co-author of *Curiosity Works: A Guidebook for Moving Your School from Improvement to Innovation, The 12 Touchstones of Good Teaching, Balanced Leadership for Powerful Learning: Tools for Achieving Success in Your School,* and *Unstuck: How Curiosity, Peer Coaching, and Teaming Can Change Schools.* Before joining McREL in 1998, Bryan was a college instructor, a high school teacher, and a business journalist.

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Student learning that works

How brain science informs a student learning model

By Bryan Goodwin

This paper is for teachers, but it isn't about teaching. It's about teaching's flip side: *learning*.

Over the years, countless books and articles have imparted much wisdom on the ins and outs of *instruction*—how teachers can create lesson plans, give feedback, develop assessments, set targets for learning, and so on. Yet this guidance tends to focus mostly on what *teachers must do* with little regard for how teachers influence *what's going on* in students' brains.

That's a little strange. After all, students' brains are where the "real action" is in a classroom. Teaching without learning is like a tree falling in the woods with no one around to hear it. The purpose of this paper is to help you develop a better understanding of how the brain processes information, which, in turn, you can use to design lessons that students will remember more of, derive more meaning from, and use as a springboard for ever-more learning.

Students' brains are where the "real action" is in a classroom.

Why does this matter? Consider this: If you were to ask 100 doctors to describe how the circulatory system works, you'd likely hear the same general answer—the heart pumps blood to the lungs, where it absorbs oxygen and is carried to cells through arteries and is circulated back to the heart through veins. Even as educators and not physicians, I'm sure most of us can readily describe this process to our students during a science lesson.

Yet if you were to ask 100 teachers how learning works—how new information gets translated into short-term memory, stored in long-term memory, and accessed in new contexts—you'd likely hear, as I have, fumbling answers as people tried to recall what they learned years ago in a developmental psychology course. It's doubtful you'd hear much clarity, specificity, or uniformity in the answers.

Let that soak in for a moment. Something as critical to learning as *how it actually works* is seldom articulated or acted upon by education professionals when designing or discussing teaching strategies or addressing student learning difficulties. Yet teaching is no less complicated than heart surgery. We might think of it as a noninvasive form of brain surgery—an attempt to rewire students' brains to implant information deeply into long-term memory so it will stay there long past the quiz next week or the final exam at the end of the semester, allowing them to recall and use it later.

With that in mind, shouldn't we consider *how* learning works when creating our units, lessons, and learning opportunities for students?

Fortunately, we *do* actually know a lot about how learning works and how we develop long-term knowledge and skills.

Yes, there are some gray areas that neuroscientists continue to debate (and sometimes further complicate) as they unravel the brain's many mysteries and marvels. Yet how we build long-term memories really isn't one of those mysteries. And let's be clear: The science of learning ought to be at the very heart of what we do as educators. We cannot afford to disregard it as theoretical or impractical—any more than we'd want our cardiologist saying, "Well, I can't be bothered with all that fancy book learning about the circulatory system; just hand me a scalpel and show me where to cut."

Not another framework

One of the likeliest reasons we don't put cognitive science to better use in classrooms is that, often, it seems nebulous and highfalutin. Some writers may seek to impress readers with their knowledge of the complexities of neuropeptides and myelin—interesting stuff, sure, but a little disconnected from the day-to-day realities of classrooms.

Moreover, those who write about the science of learning often fail to translate what we know about how the brain works into practical advice: clear, concrete guidance for creating learning experiences for students. Or if they manage to offer practical tips, they never quite manage to string those tips into a larger body of know-how, something that we might call a *student learning model.*

Oh, sure, we've got plenty of *frameworks* for teaching; we're awash in them in fact—instruments that districts and states use to evaluate teachers, which often call out, in exacting detail, the importance of such things as engaging students, planning for instruction, and using assessment to guide teaching. All good stuff.

But they're frameworks, not models.

What's the difference? Basically, frameworks list and categorize *what* is important (what we might call *declarative knowledge*) while models capture *how* things work (what we might call *procedural knowledge*).

Frameworks help us to make sense of large bodies of information by creating categories and taxonomies that help us to distinguish, for example, between species in the animal versus the plant kingdom. When it comes to instructional frameworks, many aspects of teaching are important to many people—and it's easy to point to research showing that many things work. As a result, the frameworks we employ for evaluating teachers are often too wide-ranging and unwieldy to help teachers know what matters most—or even more important, *how* to design classroom experiences that guide better learning come Monday morning. Many of these frameworks remind me of Mark Twain's quip about a camel being a "horse created by committee."

As a result, it's perhaps no surprise that despite the proliferation of teaching frameworks (and associated evaluation systems), little hard evidence exists that these things actually help teachers get better at teaching. In fact, in the Gates Foundation's annual letter published in February 2018, Bill and Melinda Gates addressed this, stating that the foundation's recent work to improve teacher evaluations had not managed to change learning outcomes for students (though they pointed to inconsistent levels of implementation as the cause, as opposed to the evaluation frameworks themselves).

Models, on the other hand, describe processes and complex phenomena, like mitosis or photosynthesis. We follow models to help us put things together in a sensible way. For example, screenwriters typically follow a three-act plot structure when writing screenplays and musicians follow a structure such as verse-chorus-bridge-verse-chorus when writing songs. And we use models to help us diagnose and solve problems—like using a model of the circulatory system to understand how blocked arteries cause heart attacks. And according to John Hattie's (2009) examination of 800 meta-analyses of research on education, one of the most powerful things teachers can do in the classroom is to design and deliver learning based on a model of instruction such as Direct Instruction, which, contrary to popular perception, is *not* didactic instruction, but rather, a process that starts with sharing learning objectives with students, engaging them in active learning, monitoring their progress via ongoing interaction, providing opportunities for independent practice, and closing with an activity that helps students make sense of what they've learned.

What [we] propose is not another framework, but a synthesis of the science of learning into a model you can follow and apply right away in your classroom.

A learning model, therefore, would describe the learning process from beginning to end—from the moment a new bit of knowledge first enters a student's consciousness through the long and perilous journey it must take before finding a permanent home in their long-term memory (Sousa, 2011). Such a model would help us to design effective learning experiences for all students. And, just as important, if they're *not* learning, the model can help us figure out where the blockage or breakdown may be occurring—where the knowledge is getting lost on its journey.

So, what my McREL colleagues and I propose is not another framework, but a synthesis of the science of learning into a *model* you can follow and apply right away in your classroom. We don't offer it as the *only* way to teach, but rather as one way to develop more expert practice in your classroom. That's important because models offer a means, but not the end, to expert professional practice.

A quick cautionary note: Models carry with them a touch of peril in addition to a heap of promise. The promise is that they can rapidly accelerate our learning by synthesizing large amounts of knowledge into a simple process to follow even before we fully understand it. Faking it 'til we make it, as it were. The peril is that we may get stuck with the model, following it mindlessly, like an amateur musician repeating the same three chords or a rookie quarterback sticking with a scripted run play even when the defense stacks the line of scrimmage. Moreover, if our model only focuses on instruction—what we're doing as teachers—we may never learn to "go meta" with our classrooms, getting outside of our own heads, as it were, to consider what we want to ensure is happening inside our students' heads.

Indeed, an important "flip" happens when we design lessons around *learning*, not simply teaching. For starters, we begin to view our classrooms through the eyes of our students, which in turn makes us more intentional as teachers, prompting us to ask ourselves, *Why* am I doing this? Perhaps most important, we can never really get to personalized learning for students if we focus only on *instruction*. This implies teachers must be the "sage on the stage," owning and directing what happens in the classroom with students participating only as passive recipients of teaching, rather than students owning their learning with teachers as facilitators of the learning.

So, are you ready to flip your thinking?

Remembering versus forgetting: seeking a compromise

At first blush, Jill Price appears to possess what seems like a super-power—the ability to never forget. Now in her early 50s, she can recall events from her teens as if they occurred yesterday.

Ask her what she was doing on August 29, 1980, and she'll tell you, "It was a Friday, I went to Palm Springs with my friends, twins Nina and Michelle, and their family for Labor Day weekend."

The first time she heard Rick Springfield's "Jessie's Girl"? March 7, 1981. She was driving in a car with her mother yelling at her.

The *third* time she drove a car? January 10, 1981. It was a Saturday. She was at "Teen Auto. That's where we used to get our driving lessons from" (McRobbie, 2017).

Price is among a group of rare people who have been clinically tested and found to have *hyperthymesia* or HSAM (highly superior autobiographical memory)—the ability to recall abnormally vast details from their lives. They can remember minutiae from years earlier, like every meal they've eaten, every phone number they've written down, every song they've heard on the radio.

Sounds awesome, yes? But in reality, not so much.

Price will tell you that having "total recall" memory creates a swirling mess in her head and leaves her teetering on the edge of sanity.

> My memory has ruled my life. Whenever I see a date flash on the television (or anywhere else for that matter), I automatically go back to that day and remember where I was, what I was doing, what day it fell on, and on and on and on and on. It is nonstop, uncontrollable and totally exhausting. . . . Most have called it a gift, but I call it a burden. I run my entire life through my head every day and it drives me crazy! (Price & Davis, 2009)

Recent studies in neuroscience are, in fact, finding that our brains appear to actively and purposefully forget most of what we learn—continually pruning and clearing out old and unneeded memories to allow us to focus on more important information. As it turns out, forgetting is as important to our memory systems as remembering (Richards & Frankland, 2017). Forgetting extraneous information simplifies our memories, decreasing the static hiss of the noisy, information-rich worlds in which most of us live and allowing us to focus on the pertinent details needed to make better decisions.

So, for the sake of our sanity and happiness, it's good that most of us forget most of what we experience. For learning? Not so great. It means that for us as educators, we are locked in a constant battle with our students' brains, which by design are programmed to ignore or forget most of what's in their environment, including what we attempt to present to them in our classrooms.

The phases of learning . . . and tactics to exploit them

Basically, any stimulus that enters our brains is not guaranteed to find a home in our long-term memory. At every step along the way, our brains are prone to tossing out the new bit of information, letting it fade into the large pile of forgotten knowledge and memories we accumulate every day of our lives.

The memory trek is made of many steps, but there are three major phases to the journey:

- First, to learn anything, we must notice it with our ***sensory register***, creating a super-short-term memory of mere seconds. By design, our brains ignore most stimuli that cross our sensory register. Stimuli that make it through our filters enter our ***immediate memory***, where we hold data for about 30 seconds.
- If we consciously focus on what's in our immediate memory (for example, by underlining or making marginal notes in the text you're reading right now), we begin to move information into our ***working memory***, where we can hold it anywhere from 5–20 minutes before it either decays or continues its journey.
- Whether information completes the final stage of the journey and finds a home in ***long-term memory*** depends on whether our brains decide to go on more than one date, so to speak, with the new information through further repetition, rehearsal, contextualization, or application.

So, how can we as educators use our knowledge of these phases to ensure that our lesson planning and instructional delivery help our students' learning stick? By following a student *learning model*, which arranges strategies for teaching and learning into a larger process for helping new knowledge travel through the phases of memory in our students.

Let's start by looking at some strategies for each phase of memory.

Sensory register and immediate memory

- *Capture student interest.* The external stimuli that make it past our brain's mental filters tend to be of two varieties: those that stir our emotions and those that arouse our curiosity (typically in that order, by the way). Our brains default to ignoring almost everything else. This means that to start the learning process—to get information past our students' mental filters—we need to help them feel comfortable in their learning environment, and then attach some form of emotion (e.g., excitement, indignation, passion) and/or intellectual stimulation to leave them scratching their heads in wonder. For example, we might posit a mystery to them like, "Thousands of years ago, the woolly mammoth was the dominant creature in North America. So, what happened? How could such a massive creature just up and disappear?"
- *Help students commit to learning the new knowledge.* Being interested is vital but only gets us so far; to go beyond learning mere tidbits of information or discrete skills, we must take the next step and commit to learning more. As teachers, we can help students do this by presenting new knowledge and skills as part of a big picture that impacts their lives as well as help them to set clear, reachable goals for their learning. In short, when it comes to learning, we need to help students answer the question, *What's in it for me?* For example, we might help students see how the mammoth's extinction connects to a modern crisis, the mass extinction of species across the globe.

Working memory

- *Help students focus on new knowledge.* Once students are "thirsty" for new knowledge, they must acquire it by actively *thinking about* what they're learning. For example, they might participate in a question-and-answer session, engage in close reading of text, follow a process as it's modeled, create a non-linguistic representation of concepts, or take notes during a lecture. All these active learning processes, especially when used in combination, help knowledge soak deeper into the brain.
- *Help students make sense of new knowledge.* Because of the limitations of working memory, we must "chunk" learning into bite-size segments interspersed with opportunities to connect new learning with prior knowledge and cluster ideas together. That's how our brains store knowledge, in fact: as webs of ideas and memories. So, while knowledge remains in our working memory, we must "make sense" of it before the details fade. For example, we might

help students group various scientific facts, details, and insights about the extinction of the woolly mammoth into the broad categories of "overkill, overill, overchill, and overgrill" (Tyson, 2009).

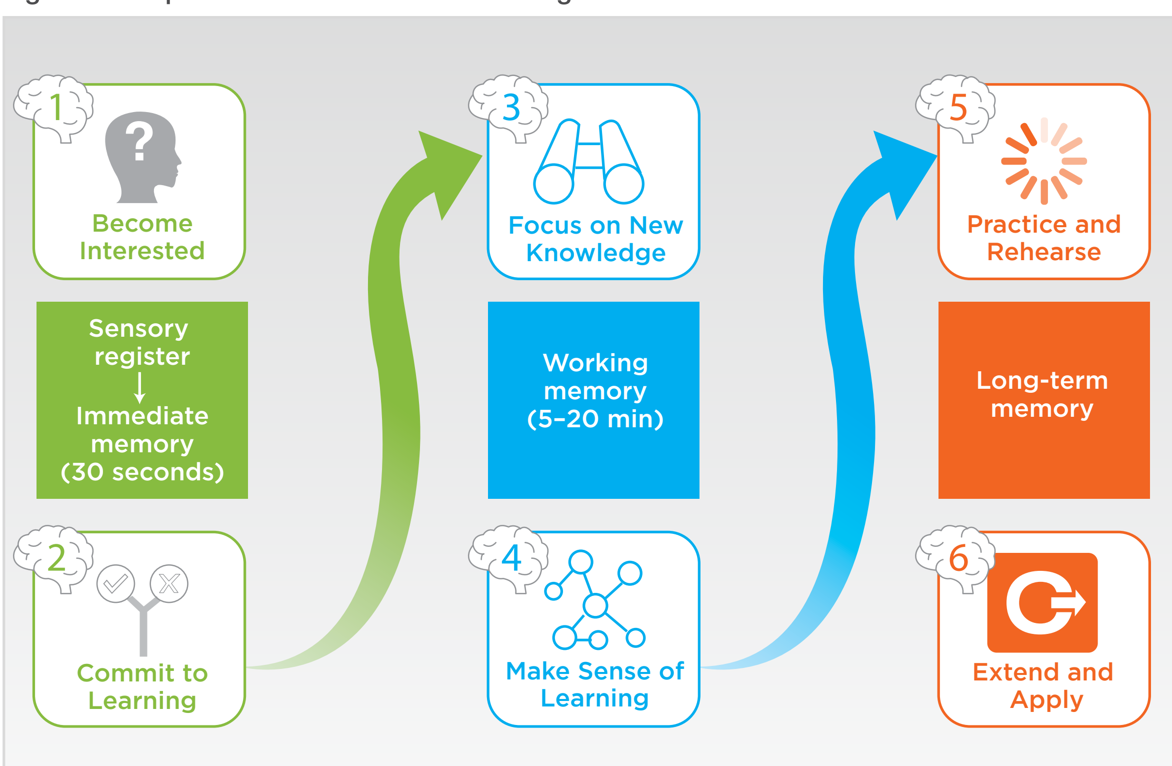
Long-term memory

- *Help students practice/rehearse using the new knowledge.* To store learning into long-term memory, we must get familiar with it, using it more than once. Cramming seldom works. Rather, we're more apt to remember what we learn when we engage in *distributed practice* (practice sessions a few days apart) and *retrieval practice* (being quizzed on or quizzing ourselves on new knowledge). Learning science shows that searching our memories for knowledge that's begun to fade rekindles those waning neural networks and strengthens memory. So, giving students multiple opportunities to repeat, rehearse, and retrieve new information makes them more apt to commit new learning to memory.
- *Help students extend their new knowledge and apply it to new situations and contexts.* We've all likely experienced the frustration of struggling to jog our memory for an important bit of information. Often what's going on in our brains when this happens is that we've *stored* the information but have too few neural pathways to *retrieve* it—certainly far fewer than those involved with information we use regularly or think about often. This use-it-or-lose-it principle of learning suggests that students more readily *retrieve* knowledge when they develop multiple connections to it by, for example, digging more deeply into it or using it to solve real-world problems. While pondering the fate of the woolly mammoth, we might encourage students to delve into the science and ethics of using DNA to bring the woolly mammoth back to life or investigate whether the forces that led to the extinction of the mammoth might now be causing the decline of megafauna in Africa.

Together, this provides us with a simple, six-phase model for student learning. We might visualize the entire process looking something like Figure 1 below.

The tables on pages 6–9 provide more detail about these six phases, along with a practical toolkit for bringing them to life in your classroom. You need not use *every tool* with *every lesson*, of course, but rather, use your professional judgement to draw upon them to design learning opportunities for your students.

Figure 1. Six-phase model for student learning



Learning phase	Information processing	Guiding questions	Design principles (learning science)	How teachers guide learning
1 Become Interested	Stimuli in our sensory register catch our attention.	*Why should students care?*	**Emotional valence** Our brains have a "pecking order" for stimuli; we first pay attention to stimuli that have emotional valence.	*Prime emotion*
		What will spark student interest?	**Curiosity** After emotionally laden stimuli, our brains attend next to novel stimuli—the unexpected, incomplete, controversial, mysterious, or gaps in our knowledge.	*Spark curiosity*
2 Commit to Learning	We determine the stimuli worthy of further attention.	*What meaning will students find?*	**Meaning and purpose** Our limbic (emotional) system is more powerful than our pre-frontal (logical) cortex; thus, we must "feel" like learning.	*Give a why*
		What will motivate students to learn? *What will connect them to the learning?*	**Commit to learning and mastery** Self-reference—connecting learning to our personal lives—is a powerful motivator of learning. Thus, students are more motivated to learn—and recall later what they've learned—when they set personal goals for learning.	*Set goals*
3 Focus on New Knowledge	We focus on new knowledge and skills while they're in our working memory.	*What do I want students to think about?*	**Active engagement** The only way to keep knowledge in our working memory is to think about it—to actively engage with the new knowledge or skills.	*Engage in thoughtful learning*
		What will I show students? *How will I help them visualize important concepts?*	**Visual learning** Our brains process information more effectively when it's presented verbally and visually.	*Support visual learning*

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The classroom toolkit

Emotional cues and questions—Help students connect emotionally to their learning—feeling excitement, surprise, sadness, joy, anger, disgust, fear, contempt.

Show them you care—Students will be more likely to learn if they feel their teachers are committed to helping them grasp the content or skills at hand.

1

Ask curiosity questions—Use mystery and suspense, incomplete sequences, "I have a secret," unusual or unexpected events to hook interest.

Structure academic controversy—Engage students in rich/robust debate about content that challenges them cognitively and, when appropriate, emotionally.

Mind the gap—Stimulate student background knowledge to prepare students for learning by revealing gaps in their knowledge.

Essential questions—Students must see the big picture of where learning is headed, so use big ideas/ essential questions to guide learning.

Give students a WIIFM (what's in it for me)—Students must see why something is important to learn. How will they use it later in life? How do people use it in the real world?

2

Encourage personal learning goals—Ensure goals are mastery, not performance, oriented.

Develop and provide success criteria that describe mastery—Help students set goals for mastery and/or above-and-beyond stretch goals.

Use advance organizers and objectives to show the path—Provide lesson-specific objectives that show students how to achieve goals. Keep the objectives—the path to success—transparent, visually available, and understandable.

Encourage effort—Help students develop a growth mindset/internal locus of control by tracking effort as well as anticipating roadblocks and how to overcome them.

Thought-provoking questions with wait time—Higher-order questions combined with wait-time before calling on students prompts students to think about their learning.

Guessing feedback—Mentally searching for answers creates curiosity and supports retrieval.

Encourage active note-taking—Writing things down and drawing pictures enhances memory. Filling in blanks ("discovery" techniques) are also effective.

Teach active learning and close reading—Show students how to quiz themselves and engage in positive self-talk.

3

Nonlinguistic representations—We're all visual learners, so visual aids (photos, diagrams, models) support learning, especially when students create them.

Modeling—Show, don't tell. Show students the steps you want them to learn and what mastery learning looks like (the "I do" phase).

Learning phase	Information processing	Guiding questions	Design principles (learning science)	How teachers guide learning
4 Make Sense of Learning	While new knowledge is in our working memory, we begin to cluster it and link it to prior learning.	*How will I chunk learning and support information processing?*	**Pausing and processing** Our working memories are limited in how much information they can hold at once (about 7 items) and how long they go before "timing out" (5–20 minutes) and needing to process learning.	*Provide time to process* Cont. on p.9
		What themes, categories, sequences, or links to prior learning do students need to make with this learning?	**Categorizing and clustering** Memories form in our brains as neural networks—as complex webs connecting ideas. In short, we learn by connecting new learning to prior learning.	*Help students categorize knowledge*
5 Practice and Rehearse	Repetition and retrieval help us store new learning in long-term memory.	*What knowledge and skills must students commit to memory or automate?*	**Spacing and mixing up practice** Memories are more likely to be stored with multiple pathways for retrieval when practice is distributed or "interleaved."	*Design and guide deep practice* Cont. on p.9
		What feedback will I provide to guide deep learning?	**Reflecting on learning** Neural networks get faster (insulated like electrical wiring) through repetition. During this process, it's essential to insulate the right pathways.	*Help students reflect on their learning*
6 Extend and Apply	Applying new learning in novel, meaningful ways supports retrieval.	*What will I ask students to do with their knowledge?*	**Extension and application** Because we store knowledge more easily than we retrieve it (e.g., events "jog" our memory), we're more likely to retrieve learning when we apply it in new ways.	*Help students apply learning to new challenges* Cont. on p.9
		How will I (and students) know they've mastered learning?	**Personal meaning and mastery** Our brains naturally prune information we don't use or find meaningful; thus, if we want students to retain learning, we must help them use it in ways that are personally meaningful.	*Help students find meaning and demonstrate deep learning*

The classroom toolkit

Chunk learning into bite-size segments—We must periodically pause during learning to build neural connections.

Cooperative learning for processing—Effective cooperative learning strategies (e.g., reciprocal teaching) support processing.

Guided practice—Immediate experiential learning boosts processing (the "we do" phase).

Clarifying feedback—Balance timeliness of feedback—allowing students to "play with" new ideas—yet provide real-time guidance with new skills.

4

Similarities and differences—Because the heart of learning is connecting new ideas to old ones, sorting and categorizing knowledge is essential for deep learning.

Summarizing—We're more likely to retain learning when we identify salient ideas, principles, and structures (i.e., summarize learning).

Analyzing and synthesizing questions—Higher-order questions help students apply and connect dots with new learning.

Create opportunities for independent distributed practice—Here, massed practice can create the illusion of fluency, so it's better to use distributed practice (sessions over time) and interleaving (practicing related, but different skills). This is the "you do" phase.

Create opportunities for retrieval practice—Because straining to recall learning builds retrieval pathways, use ungraded pop quizzes and other assessments to support learning.

5

Teach deliberate practice—Show students how to practice—targeting knowledge and skills they have not yet mastered, interleaving, and distributed practice. Help students self-assess their learning, gauging what they've mastered and what they have yet to master.

Provide formative feedback—Provide students with coaching feedback as they learn, helping them to reflect on their learning and identify next steps toward mastery.

Intellectual curiosity questions—Help students transfer knowledge and embrace curiosity thinking (e.g., "I wonder what would happen if . . .") to generate their own questions.

Guide applied learning (generating questions and finding solutions)—Give students opportunities to explore essential questions via investigations, analyses, and syntheses; without these opportunities, learning quickly fades.

Support dynamic group learning—Social learning and group projects can be a powerful way to develop deep learning, but doing it well requires both positive interdependence and individual accountability.

6

Student choice—Providing even a few (5–6) choices of how to demonstrate learning helps students develop their own interest in and personal connections to learning.

Performance assessments—Classroom assessments often measure only declarative knowledge. Performance assessments require students to demonstrate both declarative and procedural knowledge while motivating learning with student choice.

Provide feedback that promotes mastery—Evaluative feedback should encourage a growth mindset and show that learning never ends; help students see what they can do better next time.

So does it work?

If you go to the effort of designing your lessons this way, will students be more engaged? As it turns out, these six phases reflect a more metacognitive way to think about a tried-and-true approach to instruction that has a compelling body of evidence to commend it. It's an approach that started in the 1960s when researcher Benjamin Bloom advanced a simple idea: Apply core elements of one-on-one tutoring (the most effective teaching technique known to researchers) to whole-class settings. He called the approach *mastery learning*. Over the years, other educators and researchers, like Madeline Hunter, offered their own interpretations, nuances, and names to the approach. For the most part, mastery learning seeks to weave these elements together in a classroom:

- Set clear learning objectives
- Use an "anticipatory set" to focus and engage students in their learning
- Present information to students, including modeling new knowledge or practices
- Give students opportunities to practice new learning
- Check student understanding and re-teach as needed
- Confirm understanding before moving on to new content (Guskey, 2007; Hunter, 1985)

These elements, you may notice, are remarkably like the phases of learning gleaned from learning science, which is likely why this approach has proven to be so effective; it reflects the science of learning. Over the years, in fact, a compelling case has emerged for designing learning around these elements. An early study, for example, found employing the elements of mastery learning in classrooms helped three-quarters of students learn at the same levels as the *top quarter* of students in a control group (Block, 1971), and a meta-analysis of 108 studies found that students in mastery learning settings achieved fully 20 percentile points higher than students in non-mastery settings—at the 70th percentile versus the 50th percentile (Kulik, Kulik, Bangert-Drowns, & Slavin, 1990). Moreover, the approach was shown to help both high- and low-achieving students, while providing even greater effects for low-achieving students. This suggests that designing learning in this way may resolve the enduring challenge of supporting struggling students while simultaneously challenging high performers; high achievers can engage in independent enrichment activities (i.e., extending and applying their learning) while struggling students receive re-teaching (English, Dickinson, McBride, Milligan, & Nichols, 2004).

A caveat: Simple is not easy

Despite these compelling data, this approach is hardly commonplace in classrooms and schools. Why should that be? One reason may be that while the approach is simple, it's not always easy to implement (English et al., 2004). As Madeline Hunter observed, "This model is incredibly simple in conceptualization, incredibly complex in application" (1985, p. 60); to apply it consistently in classrooms, teachers need plenty of supportive feedback and coaching.

So, as you first begin to use this student learning model in your classroom, it may feel a bit clumsy or mechanistic. Your transitions from one phase to the next may feel awkward or contrived. And you may find yourself focusing much of your mental energy on what *you* are doing instead of what *your students* are doing or thinking. The good news is that as with any new expert skill—be it golfing, playing the guitar, bowling, or skiing—after a relatively short period of sustained practice (say about 50 hours), you're likely to become pretty good at it (Ericsson, Prietula, & Cokely, 2007). So, if you hew closely to this model for several weeks, you should begin to feel more comfortable using it in your classroom and find yourself able to integrate the elements more seamlessly and gain new insights into how to guide student learning.

Don't get stuck there, though, thinking you've found the "one right way" to teach, which is a common pitfall of instructional models; they often get misinterpreted as lock-step approaches or checklists for teaching. Hunter argued vociferously against such misinterpretations, insisting that a model should never be a mere checklist to follow (or beat teachers over the head with), but rather, serve as a "launching pad from which creativity can soar" (1985, p. 58).

Indeed, it's this recognition of the power and peril of teaching models that led to the creation of this *learning* model. An *instructional* model typically delineates teacher behavior, not student behavior, so it's easy for teachers (and school administrators) to misconstrue it as a simple checklist to follow. Learning objectives? *Check.* Information shared? *Check.* Guided practice? *Check.*

A learning model calls upon teachers to "go meta" with their practices—stepping outside of themselves—to contemplate and reflect on the impact they're having on students.

Yet teachers can check these boxes (and administrators *insist* they check them) without ever really considering student learning and what adjustments teachers ought to make to ensure students *are* learning. In short, it's possible to follow an instructional model rather mindlessly, as though it were a checklist. And if all we do is mindlessly follow a checklist, we run the risk of becoming what folks back in the Midwest where I grew up call "chicken feed" teachers, scattering knowledge to the flock without concern for who gets it and who doesn't.

As noted earlier, a *learning* model, on the other hand, calls upon teachers to "go meta" with their practices—stepping outside themselves, so to speak, to contemplate and reflect on the impact they're having on students. For example, instead of merely posting a learning objective in front of the room, they must ask themselves, *Have I helped students commit to learning this?* And instead of merely assigning homework, the learning model asks them to consider, *What new knowledge or skills do I want students to practice?*

Moreover, a learning model can support deeper professional dialogue with our colleagues. The key element of any profession is, in fact, having shared mental models and understanding of how things work, and using those shared mental models to diagnose and solve problems. For example, if students are struggling to learn particular content, you and your colleagues can use the learning model to diagnose what might be occurring. Are students uninterested? Not committed to learning? Or you might ask, do we need to re-think our approach to helping them focus on new knowledge? Should we give them better opportunities for sense-making, practice, and/or application of learning? In short, you can size up where the breakdown in learning may be occurring and refer to the toolkit to see what different strategies you might apply.

In many ways, that's the whole point of this learning model: to support more reflective practice by helping you consider *why* you're doing *what* you're doing in the classroom—a distinction that is the hallmark of expertise and often eludes novice teachers. The elements of this six-phase learning model shouldn't be regarded as strict *rules,* though, but rather design *principles.* There's a big difference between the two, notes screenwriting guru Robert McKee (1997), who provides screenwriters with a simple model for screenplays: a three-act structure comprised of scenes with turning points. He writes:

> A rule says, "You must do it this way." A principle says, "This works . . . and has through all remembered time." The difference is crucial. Your work needn't be modeled after the "well-made" play; rather, it must be well made within the principles that shape our art. Anxious, inexperienced writers obey rules. Rebellious, unschooled writers break rules. Artists master (the principles). (p. 18)

The same could be said of educators attempting to apply a learning model in their classrooms. With all of this in mind, hopefully you'll see this model not as your final destination as a teacher, but as a starting point in your ongoing journey to develop your expertise and artistry as a professional educator.

Reach the author and other experts at McREL who are exploring student learning models:

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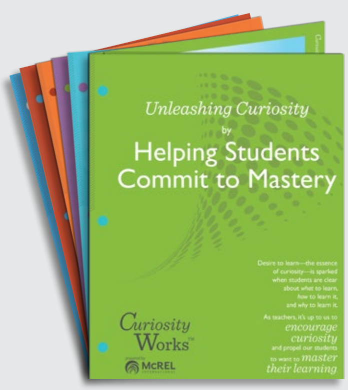

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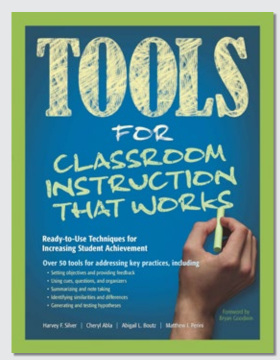

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