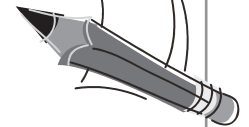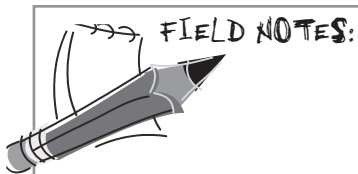THEME **8**

Chunking

Chunking

Definition. The ability of the teacher to segment the curriculum and learning activities into manageable portions to avoid overwhelming students' capacity for new information.

Elaboration. According to information processing theory, we have a limited capacity to consciously handle incoming information (Cowan, 1997). Rather than being able to attend to an unlimited number of items simultaneously, we can attend to only a few. While this might seem like an unfortunate design flaw in human memory, it is actually necessary to give us our powers of focus and attention. Adults have a larger capacity than children, but it is still limited (Miller, 1956). Our capacity to consider incoming information is limited to a handful of chunks. A chunk can be thought of as a discrete "package" of information. Chunks can be small like the number 5 or large, like a telephone number- 704-825-8562. Chunks can be simple like the definition of "previous", or complex, like how to drive a car from a stop sign up an icy hill with a manual transmission. Whether our chunks are large or small, simple or complex, we seem to have only about
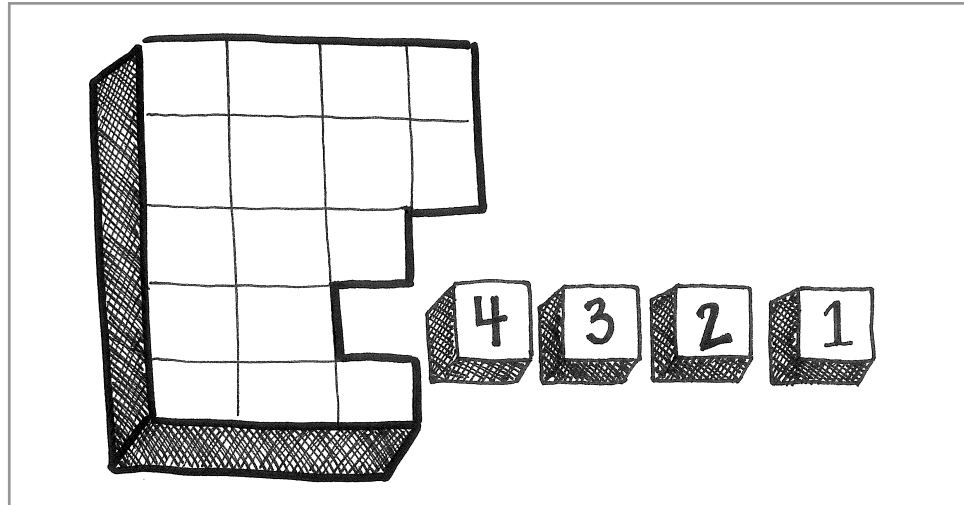
A good juggler keeps several balls in the air, but holds onto only one at a time.

seven of them available to us at any given moment (Miller, 1956; Simon, 1974). Chunking, then, is the process of combining small chunks into larger ones and building the complexity and sophistication of chunks to increase the quantity and quality of learning.

A working memory overload (WMO) is a state of rapid forgetting induced by a task that exceeds the capacity of working memory. As teachers seek to avoid WMOs for their students, they do well to remember the two limiting factors of working memory.

Working memory has a limited capacity. Adults have a working memory capacity of approximately seven discrete chunks (Miller, 1956). Since we hardly ever seek to concentrate on completely discreet chunks simultaneously, it is more helpful to consider that adults can manage three or four representations, or collections of discreet chucks at once (Cowen, 1997). Children have a smaller capacity (Ross-Sheehy, Oakes, & Luck, 2003), perhaps managing one or two representations, rather than three or four for adults (Barner, Thalwitz, Wood, Yang, & Carey, 2007; Moher, Tuerk, & Feigenson, 2012).

Learning is a result of listening, which in turn leads to even better listening and attentiveness to the other person. In other words, to learn from the child, we must have empathy, and empathy grows as we learn.
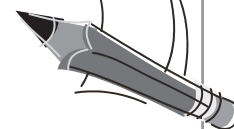
– Alice Miller

Keeping this limitation in mind, teachers would do well to keep new information demands at or below the working memory capacity of their students. For example, a first grade teacher knows not to give multiple step directions to students. This would exceed capacity and lead to an overload.

It is important to help students to combine and consolidate information. For example, through several rounds of practice, a teacher could help students see the four steps in long division as one process, rather than four discrete steps. This process of increasing the size and complexity of chunks is what allows students, even young ones with limited working memory capacity, to build rich understandings and meaningful connections among disparate pieces of information.

Working memory functions as a serial (one at a time) processor. A student's working memory can attend to only one task at a time. Humans can switch back and forth between tasks rapidly, appearing to be multi-tasking, but at any given split second, they are handling just one mental task at a time (Sternberg, 1966). Again, this is not so much a limitation on our ability to multi-task, as it is a valuable ability to focus and concentrate on individual tasks.
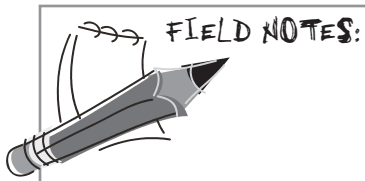
The fact that humans can only focus on one task at a time doesn't mean we can't have several things in our sphere of attention simultaneously. We must choose, however, which item will be in the foreground, as we relegate all other attentions to the background (Townsend & Fific, 2004). It is a bit like a good juggler can keep several balls in the air while holding onto only one a time. As I am writing this chapter, I'm also waiting for the delivery truck to deliver a package, keeping an eye on our 5 month old puppy, Wilson, and copying some video files from this computer to another. Writing is in the foreground and the rest is in the background., that is, until Wilson barks or I see the delivery truck pull into the driveway. Then, the foreground and background trade places, if just for a moment.

FIELD NOTES:

It is only as we develop others that we permanently succeed.

– Harvey S. Firestone

The juggler grabs another ball and the one he was holding is now in the air.

As teachers understand this process and its subtleties, they are more capable of orchestrating a classroom environment that limits giving students multiple foreground tasks simultaneously. It is difficult for students to listen *and* take notes, to finish their homework *and* listen to the afternoon announcements, or to follow along as text is read aloud *and* spot descriptive words.
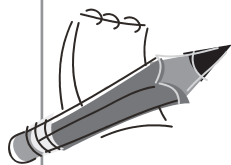
Students also benefit when their teachers appreciate some of the nuance of foreground/background attention. Some of the most productive classrooms have multiple processes going on at the same time; group work, individual work, soft music playing, teachers holding conversations with individual students, centers, clean-up, and so on. The trick is to help students keep the foreground in focus and not let the background steal the show too often.

An understanding of serial processing can also benefit behavior management. Rather than asking students to not do something or to stop doing something, ask them to do something else. The brain can't focus on both so the new behavior displaces the old one. Instead of saying "Thomas, please stop talking." A teacher might say "Thomas, will you use your left pinkie finger to point to the picture of the elephant on page 45?" If Thomas complies, he must at least temporarily, stop talking.

Because of serial processing, it is difficult for us to *not* do something. Have you ever tried to not smile, or not giggle in church, or not touch a button? If you're a golfer you know how hard it is to *not* hit it in the pond. Our youngest son, Bennett, was a serial milk spiller as a toddler. I remember it didn't help much to say "Bennett, don't spill your milk." It was more effective to say "Bennett, hold on with both hands." So we humans can't focus on many things at once, but we also can't focus on nothing.
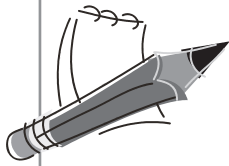
All real education is the architecture of the soul.

– William Bennett

ELABORATIONS AND EXTRA NOTES
examples, applicatons, implications, connections, questions, adjustments, deeper layers, reactions, times not to …

ELABORATIONS AND EXTRA NOTES
examples, applicatons, implications, connections, questions, adjustments, deeper layers, reactions, times not to …

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