

Chapter 1

The Unified Learning Model

The Unified Learning Model (ULM) is a model of how people learn and a resulting model of teaching and instruction. The academic literature is filled with models about learning, teaching and instruction. The most obvious question then is, “Why do we need another theory/model of learning?” Our answer is that the current literature contains only limited theories about isolated specific learning and instructional phenomena. As a result each of these theories explains some, but not all learning phenomena. In addition, each tends to have its own vocabulary. The result is a hodge-podge of specific learning principles and teaching guidelines that often seem in conflict with each other.

The ULM, as its name suggests, is a unifying synthesis of these existing theories. The ULM is not based on some revolutionary new research findings on how people learn. In fact, while recent advances in neurobiology and brain science have enlightened our understanding of the underlying neural mechanisms involved, we have known how people learn for a long time. There are very mature and well researched areas within the broad field of learning and teaching. What the ULM does is bring these disparate topic areas together under a single umbrella. It connects them together with simplicity and clarifies the ways in which they are interconnected.

The ULM accomplishes this by focusing on the basic processes and components of learning. Our contention in this book is that the components of the ULM underlie all learning phenomena. Hence, all current models and theories of learning, teaching, and instruction can be subsumed within the ULM. Our goal with the ULM is to replace the current diverse and confusing array of learning concepts and terminology with a scientifically grounded concise set of core learning principles. If you understand these ULM principles, you understand how learning occurs and how this learning can be facilitated by teaching and instruction.

Following what is commonly referred to as Occam’s Razor (or the rule of parsimony), we aim to suggest a model that is simple while explaining all observed phenomena.¹ So what are the components that underlie all learning phenomena? In the ULM there are three: working memory, knowledge, and motivation.

Working Memory

The centerpiece of the ULM is working memory. Working memory is where temporary storage and processing of information happen in the brain. Suppose someone were to read to you a series of single digit numbers at a rate of one per second (for example, “one, three, seven, four . . .”). You then are expected to recite back those same digits. Most of us can recall around seven digits without error. With just a little practice, we can do much better – say 15–20 digits. The number of digits is a crude measure of your working memory capacity, and “the place” where you do this is called your working memory. Working memory is central to all current models of cognition and neurobiology. In the scientific literature, one cannot talk about thinking, attention, decision making, brain functioning, or, most importantly, learning without talking about working memory. Understanding working memory is the key to understanding learning. So you may ask, “If working memory is so important, why have I never heard much about it?” “Why isn’t working memory the primary topic in every pre-service or in-service education course?” We have asked these questions ourselves. Our answer is this book.

The way working memory functions dictates how learning happens and what instructional methods and techniques facilitate or hinder learning. A science of learning, teaching, and instruction must be based to a great degree on the science of working memory. The ULM is this working-memory-based science of learning. We will spend considerable time discussing how working memory operates, how working memory produces learning, and how the operation of working memory can be influenced through teaching.

Knowledge

The ULM, however, includes more than working memory. The second core component of the ULM is knowledge. In the scientific literature of cognitive psychology, cognitive science and neuroscience, knowledge means something very different than the way educators typically think of the term. Educators usually think of facts and general concepts when they hear “knowledge.” For example, think of the first level of the original Bloom’s Taxonomy, the “knowledge” level. A revision of the original taxonomy calls this the “remember” level.² In the scientific literature, however, knowledge means *everything* that we know. It not only means facts and concepts, but also problem solving skills, motor behaviors, and thinking processes. Every category of Bloom’s Taxonomy, then, is knowledge to a cognitivist. Knowledge is kept (or stored) in long-term memory. Psychologists generally just call this *memory* and drop the “long-term” modifier. Memory is the cognitive term for the brain and nervous system, thus knowledge is everything we know or can do that is stored in our memory.

Knowledge has a two-fold role in the ULM. First, knowledge is the goal of the ULM. The purpose of learning is to increase the many facets of our knowledge.

Learning has occurred when our store of knowledge is increased or changed. In one very important sense, knowledge is the outcome or result of the operation of working memory. It is working memory's product. Knowledge, however, has a second function. Knowledge influences how working memory operates. The things working memory can do are affected by existing knowledge. In relation to learning, you may have heard of this as "the prior knowledge effect": the more you know about something, the easier it is to learn something new about it. So knowledge is a process of working memory as well as its product. We will devote much time to discussing how knowledge is increased, how it becomes more sophisticated, how it moves through Bloom's hierarchical taxonomy, and how this increasing knowledge impacts future learning.

Motivation

The third and final component of the ULM is motivation. Educators are immediately aware of how important student motivation is in the classroom. Motivation is discussed often in education. It is framed in terms of things like interest and preference or building students' self-confidence and self-esteem or rewards or goals. Motivational ideas and constructs are seemingly everywhere, and motivation is currently one of the most highly researched topics in education.

The ULM has a very specific role for motivation. Motivation is the impetus for directing working memory to a task; in our case, directing working memory to the task of learning. To our knowledge, the ULM is the only model of learning or motivation that explicitly links motivation to working memory.³ Motivation is an inherent component of working memory operation and plays a critical role in effective and efficient allocation of working memory to learning. Understanding how motivation works in conjunction with working memory will help teachers understand how the various motivational constructs they have heard about actually work to motivate students to learn. So we will spend much time examining how motivation and working memory operate.

Three Principles of Learning

The ULM is founded on three basic principles of learning:

1. Learning is a product of working memory allocation.
2. Working memory's capacity for allocation is affected by prior knowledge.
3. Working memory allocation is directed by motivation.

These three principles of learning form the foundation for a complete theory of instruction and teaching. Simply put, teaching that follows these principles will be effective; teaching that does not follow these principles will be ineffective.

The remainder of this book is divided into two sections. The first will cover the three basic components of the ULM to explain how working memory, knowledge, and motivation work to produce learning. This is the underlying model of learning that forms the foundation of the ULM and from which the three basic principles are derived. The second will use the three basic principles of learning to develop recommendations for successful teaching and instruction.

Notes

1. http://en.wikipedia.org/wiki/Occam%27s_razor (Accessed March 22, 2009).
2. The original taxonomy is found at: Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals*. New York: D. McKay. The revised taxonomy is found at: Anderson, L., & Krathwohl, D. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Columbus: Merrill. The original levels were labeled knowledge, comprehension, application, analysis, synthesis, and evaluation. The labels in the revised taxonomy are remember, understand, apply, analyze, evaluate, and create.
3. Hayes offered a framework that included motivation and working memory together as part of a scheme for understanding writing. The ULM is a general learning model that applies to all learning (not just how to write) and makes specific the role of motivation in the learning process. Hayes, J. (2000). A new framework for understanding cognition and affect in writing. In R. Indrisano & S. J. Squire (Eds.), *Perspectives on writing: Research, theory, and practice* (pp. 6–44). Newark, DE: International Reading Association.