What do students need to *learn*?

Learning outcomes can fall into a few broad categories:

1. **Knowledge and Understanding**
2. **Thinking Skills**

**Knowledge and Understanding**

While knowledge and understanding are important outcomes of many courses and programs, today they are less important than they were a generation or two ago for several reasons.

The amount of knowledge available to us has exploded. We know, for example, far more about the building blocks of matter than we did a generation ago. There is more history to understand than when our parents went to school, and the study of world history in the U.S. has broadened from a Eurocentric model to a global one. Today there are so many important concepts that we cannot expect students to remember them all.

We have increasingly easy access to knowledge. Is it so important to remember a formula, date or vital statistic when it can be looked up effectively? This can be true depending on the area of study. If I am a historian who wants to compare some piece of history to the current day environment, I can easily look up that piece of history, review it, and apply it. However, when a medical doctor has a patient in from of them is in cardiac arrest, they need to know the amount of epinephrine to give that patient without having to take the time to check the internet.

Finding and using information is more important than remembering it. Today we need to be able to find, analyze, evaluate and use facts and concepts as well as understand them. But again, this may be circumstantial. If same medical doctor has a patient with multi-symptoms, who does not fit any of the typical diseases and cannot look things up and apply them, they may never figure out how to help that patient.

Our knowledge base will continue to expand and evolve. Today’s students will someday need information that hasn’t yet been conceived and insight that hasn’t yet been drawn, rendering obsolete some of the information we now teach. Should we focus on having students remember material that may soon be outdated or irrelevant? Or should we focus on developing the thinking skills they’ll need to master new concepts on their own?

Much of what students memorize is committed to short-term memory and quickly forgotten. Imagine how your students would do if they retook your final exam—with no additional studying—just a few week or months later. How much would they remember from the first time they studied for it? Probably not much...and is it worth spending time teaching material that’s so quickly forgotten? Or should we focus instead on developing skills and attitudes that will last a lifetime, such as the ability to write well, analyze the difference between two theories, or appreciate American folk music?

Does this mean that students shouldn’t memorize anything anymore? Absolutely not! A certain amount of memorized knowledge is necessary and important. We wouldn’t want to fly in a plane whose pilot has to look up the meaning of that flashing light as the plane goes into a nosedive. We wouldn’t want to be operated on by a surgeon who has to pause to read up on how to stop excessive bleeding. Students will always need to remember and understand certain fundamental concepts—just not as much as they once did.

**Thinking Skills**

As knowledge and understanding have declined in importance, thinking skills have increasingly critical. Many kinds of thinking skills are emphasized in today’s college curricula.

**Critical Thinking** is a widely used term whose meaning lacks popular consensus. It’s often used as an umbrella term for many kinds of thinking skills that go beyond basic understanding, including analysis, synthesis, evaluation, problem-
solving, information literacy, and some habits of mind. If critical thinking emerges as a potential learning goal in your course or program, spell out the kinds of thinking skills it encompasses in your situation.

**Higher order thinking skills (HOTS)** are those beyond basic understanding. HOTS may thus be a synonym for critical thinking, depending on how the latter is defined.

**Application** is the capacity to use knowledge and understanding in a new context. It includes the abilities to understand cause-and-effect relationships, interpret logical propositions, criticize literary works, and apply scientific principles to research problems if these relationships, propositions, works, and problems are new to the student. Many mathematics work problems require application skill.

**Analysis** is the capacity to break a complex concept apart to understand the interrelationships among its components. Students who can analyze can identify the elements, relationships, and underlying principles of a complex process. Analysis is not merely understanding the relationships of components of a process or concept explained in coursework; that would be simple understanding. Students who can analyze can understand the structure of things they haven’t seen before. They can think holistically, make a case, discover the underlying principles of a relationship, and understand organizational structure.

**Evaluation, problem-solving and decision-making** skills have more in common than not. They are all skills in making informed judgements about the merits of something the student hasn’t seen before. They include skills in conducting research, making appropriate choices, solving problems with no single correct answer, and making and justifying persuasive arguments. They are not merely understanding and reflecting arguments that have been presented in coursework; that would be simple understanding.

**Information Literacy** is often erroneously thought of as library research skills. It is actually a much broader set of skills, reflecting today’s reality that much research and inquiry takes place outside of the traditional college library (Association of College & Research Libraries, 2016). Information literacy includes many of the (critical) thinking skills discussed in this section, and some might consider it synonymous with research or problem-solving skills.

**Synthesis** is the capacity to put what one has learned together in a new, original way. It includes the abilities to theorize, reflect, construct hypotheses, generate new ideas and new ways of viewing a situation, and invent.

**Creativity** is another concept whose meaning lacks popular consensus. Among creativity scholars, the most widely accepted definition is “a novelty that’s useful (or appropriate).” Creativity might also be thought of as producing new and good ideas or products through imaginative skills, which might include the abilities to synthesize as discussed above, be flexible, take intellectual risks, and be open-minded to new ideas.

**Metacognition** is learning how to learn and how to manage one’s own learning by understanding how one learns, thereby preparing for a lifetime of learning. Metacognition skills may include:

- Using efficient learning techniques
- Forming efficient plans for completing work
- Evaluating the effectiveness of one’s actions such as one’s problem-solving strategies
- Critically examining and evaluating the bases for one’s arguments
- Correcting or revising one’s reasoning or arguments when self-examination so warrants