

ACQUIRE / ANALYZE / APPLY A NEW COGNITIVE CONSTRUCT

Timothy Baird, Ed.D.

To talk about learning and the science behind it, it is helpful to start with a common construct or framework. In essence, this serves as the guiding language identifying the different types of learning that take place as the learner evolves through the learning process. The universal language of most educators related to cognition has been Bloom's Taxonomy of Cognitive Skills. (See Figure 1) Lorin Anderson updated Bloom's work and this New Bloom's Taxonomy now serves as the standard framework for discussing learner progression. (See Figure 2) Yet, despite the universal appeal of both frameworks, neither format of this model addresses the new focus on global competencies expected from today's generation of students. In today's educational reality, the highest level of cognitive performance is not found in the critical or creative pursuits but rather in the learner's ability to apply what was learned. The more real life focus found within the learning application, the higher the level of cognitive attainment.

Figure 1
Bloom's Taxonomy of Cognitive Skills

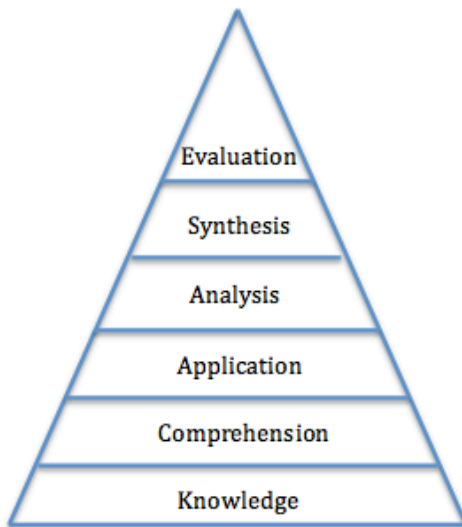
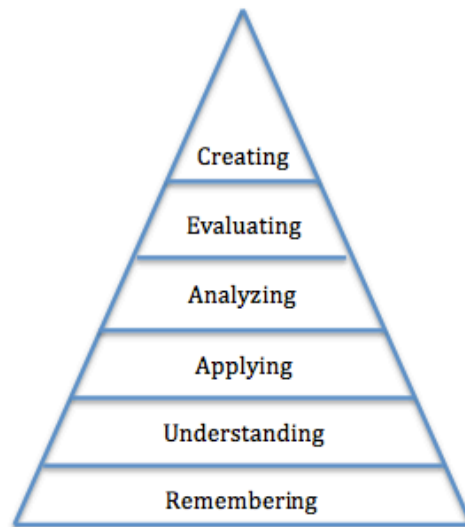
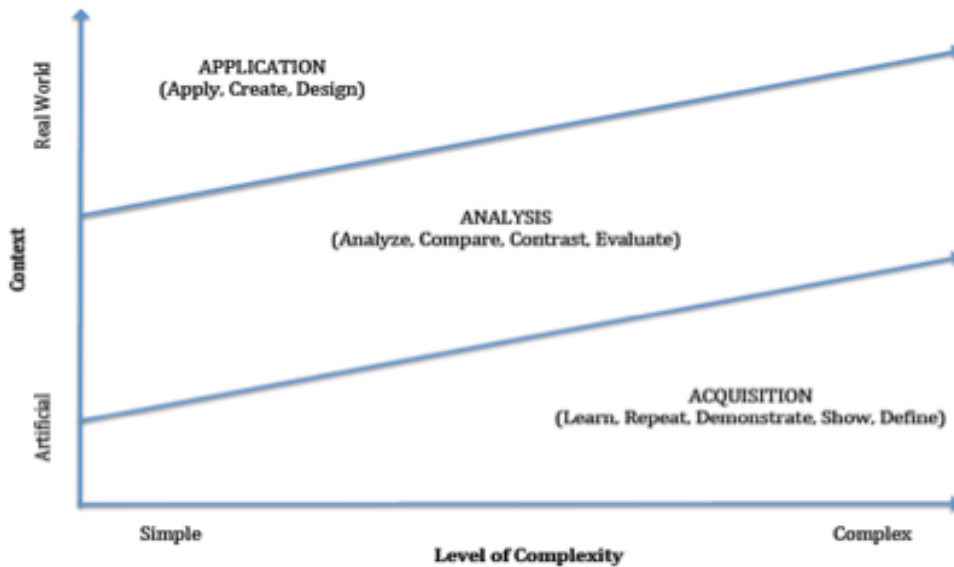


Figure 2
New Bloom's Taxonomy of Cognitive Skills



In our new cognitive construct (See Figure 3), there are three basic stages of learning. These stages are Acquisition, Analysis, and Application. This construct also extends along two axis lines. The base axis shows the progression of the stages from simple to complex. The second axis measures the context of the learning from artificial to real world use.

Figure 3
Cognitive Construct



This model shares some of Bloom's structure but also differs with Bloom's Taxonomy in many significant ways. Similar to Bloom, the model starts with learning new information and acquiring basic skills. This by itself can be a very easy or challenging practice depending upon the complexity of the task. The complexity is further defined by the content or skill itself, and the learner's prior knowledge. The context for use of the information or skill is also important in the learning process. The more the learning can tie into real world use, the more connections the learner makes to the information.

ACQUISITION

All processing of information and ultimately the application of new learning must begin at the Acquisition Stage. Requisite actions at this level of learning would be learning various ways to take in new information and skills, retaining and understanding the information acquired, and developing schema, or a mental organizational plan, that allows the learner to recall the information or skill when needed. Verbs often associated with the Acquisition Stage are: learn, repeat, demonstrate, show, or define.

It is sometimes mistakenly believed that acquisition is always the bottom of the cognitive construct hierarchy. This is not true. Although all learning must start with acquisition, it is possible to have a complex form of acquisition learning focused on real world learning that is significantly more challenging than a simple act of analysis or even application. Learning to speak a foreign language is a good example of this. Learning the correct verb tense in Mandarin is significantly more challenging than determining the tone in a story or many other tasks that require simple analysis or application of a basic skill in an artificial setting. Context and level of complexity matter!

ANALYSIS

The Analysis Stage of our construct is focused around the learner's ability to break learned information down into various component parts. Once the information is dissected, the individual parts or connections to the whole can be reviewed. At this level the learner is also connecting her schema to help understand how this new learning fits with other knowledge at a deeper level. The heart of analysis is created from the learner's depth of reviewing similar component elements or different component elements between items and then using this assessment to make determinations. This deeper analysis or evaluation based upon analysis is at the highest end of the complexity spectrum. This contrasted with Bloom is not the top end of all cognitive behavior but merely the apex of cognitive behavior within the analysis area. Verbs often associated with the Analysis Stage are: analyze, compare, contrast, and evaluate.

APPLICATION

At the highest stage of this new learning construct is Application. In this stage, the learner is using the knowledge or skill learned, incorporating the analysis and processing related to this knowledge or skill and then using this combination of information to create some form of output. Application can take many forms. Often it can be confused with the other stages because it incorporates so much of what has previously been done. The difference in actually applying a new skill versus just practicing a new skill can be subtle but significant. Application requires the learner to choose from a variety of learned behaviors in unique settings. To masterfully apply a skill, the learner usually must have solid acquisition and thorough analysis of the component pieces of the skill first.

One of the higher order extensions of application is creation. Here the learner is expanding her new knowledge. Through the operations of designing and building connected or altered schema, the learner in the creative process moves from the parts to a newly imagined whole. Writing is a perfect example of this. The learner may start with a series of key ideas and individual facts but the process of creating or writing brings these different elements together into a new structure.

The peak of our new cognitive construct is the application of learning. Application as a concept has moved up in the learning universe since Bloom's day. In this new model, we again move from a simplistic, artificial understanding of application to a much more complex real world usage of the skills or knowledge learned. Real world application requires the learner to adapt to new situations, respond to real challenges or issues, and ultimately present one's findings to a real audience. Solving a math word problem is one form of artificial application of knowledge and is helpful for practicing real world application. Creating a 21st Century classroom where you have to measure and lay out learning spaces, design furniture, build a budget, and eventually convince a funder through a multi-media presentation is at an entirely different level of authenticity. This latter task is the type of learning experience that project based learning is attempting to inspire and when done well will stimulate the learner to learn and accomplish more than most traditional learning experiences. Verbs often associated with the Application Stage are: apply, create, and design.

THE COMPLEXITY AXIS

Learning tasks can vary significantly in complexity regardless of the learning stage. Learning to tie one's shoes, count by twos, or play the cello all require different levels of complexity and requisite skill teaching. In the Acquire/Analyze/Apply Learning Construct this is represented by the complexity axis. At the low end of the axis are simple tasks. These are usually low level learning tasks that don't require varied learning inputs and processes to be linked together. Simple learning tasks whether in the Acquire, Analyze, or Apply stage of learning can usually be accomplished in shorter time frames and usually reflect one or two skills needed in the execution of the task.

On the other end of the spectrum are complex tasks. These tasks usually involve multiple components and/or skills. Frequently highly complex tasks take considerable time and effort. For the learner to be successful at complex tasks, she must have clear mastery of the skills and knowledge preceding the task.

THE CONTEXT AXIS

The other axis of the Acquire/Analyze/Apply Cognitive Construct is the Context Axis. All learning takes place in a context. The scale in this construct runs from low-level context or, "artificial," to high level context or, "real world." The difference between these two variables is significant both for the task and the learner. Artificial context tasks are designed to use the learning in a setting that is more practice field or lab in design. Learners at the real world level of context are directly using their skills in real problem solving and situations. At the lowest level, the learner is aware that the knowledge is being used in an artificial setting. There is nothing wrong with artificial context and it is an appropriate place to test and practice new ideas, skills, and knowledge. Artificial context activities tend to be lower stakes and allow for experimentation on the part of the learner. Although appropriate for all three stages and all initial learning, it is important to note that the learner engagement increases as the level of context rises. Put a different way, if the learning has real purpose then the learner will invest more of herself in the final product so it is necessary for the learner to move up the context scale as their skills increase.

IMPLICATIONS FOR LEARNING

All cognitive theory is designed to show what steps learners are undertaking or to give guidance to teachers to help drive learning situations. The Acquire/Analyze/Apply Cognitive Construct is no different. From the learner perspective, it is important to note that learning takes place in three basic stages and involves both complexity and context. Jumping too quickly in stage, complexity, or context might create an unstable or unsuccessful learning situation. Stages need to build upon each other and complexity and context need to be increased when appropriate for maximum learning to occur.

From a teacher's perspective, this construct should also be instrumental in helping to prepare learning situations for students. Lesson and unit plans should build upon prior knowledge and evolve from acquisition to analysis to application. The goal should also be to increase the complexity of learning over time tying together more complex and intricate learning experiences as the learner becomes more experienced with the information and skills. The

teacher must also move the student up the scale from artificial learning experiences to more authentic ones. The real test of all learning is whether the learner can apply new skills and knowledge in unique settings to solve real world, complex problems. When we have achieved this, real learning has taken place.