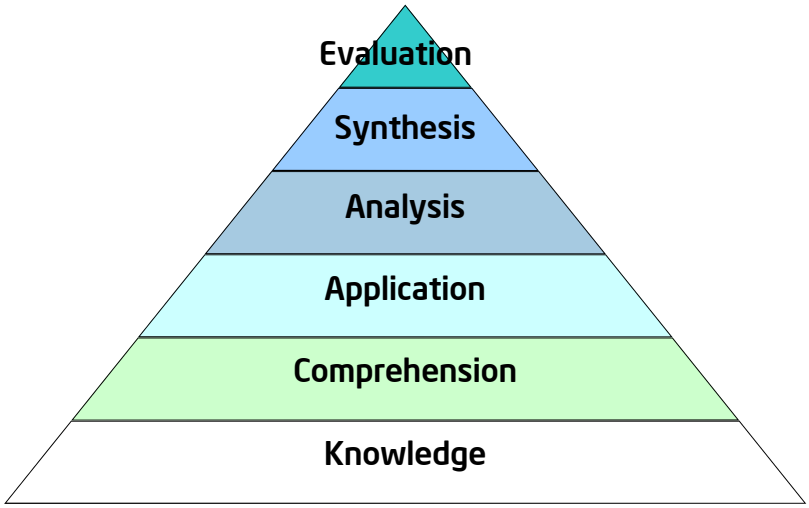
Evidence of Impact

Higher-Order Thinking Skills

A vital part of the 21 century skill set, *higher-order thinking skills* are often defined using Benjamin Bloom's Taxonomy. Published in the 1950s, Bloom's Taxonomy has been an organizing tool for educational reform efforts for decades.

Bloom's Taxonomy

According to Bloom's Taxonomy, thinking tasks can be divided into six levels of increasing cognitive demand. The highest levels of his model represent the most sophisticated and meaningful thought processes, or higher-order thinking. Read more about Bloom's Taxonomy.



Since Bloom's landmark work on the categorization of thinking tasks, other important models have added to our understanding of how we think and learn, and have contributed to educational reforms.

Marzano's New Taxonomy of Educational Objectives

In the late 1980s, Robert Marzano identified thinking skills within a framework of five Dimensions of Learning:

1. Attitudes and perceptions
2. Acquire and integrate knowledge
3. Extend and refine knowledge
4. Use knowledge meaningfully
5. Habits of mind

Find Out More

Intel® Education Programs Support Higher-Order Thinking Skills

Read more about how the Intel® Teach Thinking with Technology course focuses on higher-order thinking skills.

In Marzano's learning model, each cognitive category is as important as the others, and higher-order skills such as analysis, using knowledge, and metacognition (or self-awareness and monitoring of the thought process itself) play an essential role in learning.

Marzano published a New Taxonomy of Educational Objectives in 2000 as a way to solve problems that he had identified in Bloom's Taxonomy. In Marzano's New Taxonomy, he provides a richer, more complex picture of how students think and learn. Read more about Marzano's New Taxonomy.

Costa and Kallick's Describing 16 Habits of Mind Model

In the late 1990s and early 2000s, Arthur Costa and Bena Kallick collaborated with other educators to develop a model defining 16 Habits of Mind and how those habits could be used and cultivated in school settings.

Costa and Kallick's model does not seek to categorize all areas of thinking (like Bloom), or how knowledge is used within the context of a social and personal environment (like Marzano).

Instead, Costa and Kallick define 16 habits that are required to overcome difficult challenges:

1. Persisting
2. Thinking and communicating with clarity and precision
3. Managing impulsivity
4. Gathering data through all senses
5. Listening with understanding and empathy
6. Creating, imagining, innovating
7. Thinking flexibly
8. Responding with wonderment and awe
9. Thinking about thinking (metacognition)
10. Taking responsible risks
11. Striving for accuracy
12. Finding humor
13. Questioning and posing problems
14. Thinking interdependently
15. Applying past knowledge to new situations
16. Remaining open to continuous learning

All Intel Education programs are designed to support teachers and students in the use of higher-order thinking skills. In fact, the promotion of these skills is the central focus of the professional development curriculum of the Intel® Teach Thinking with Technology course. The course enables teachers to use Intel's free online thinking tools, *Visual Ranking*, *Seeing Reason*, and *Showing Evidence*, which enable students to explore these key thinking skills.

Find Out More

Correlating Research on Higher-Order Thinking Skills

Bloom, B. S. (1984). *Taxonomy of educational objectives.* Boston, MA: Allyn and Bacon, Pearson Education.

Carr, K. S. (1990). *How can we teach critical thinking?* Urbana, IL: ERIC Clearinghouse on Elementary and Early Childhood Education. Retrieved from www.ericdigests.org/pre-9218/critical.htm

Costa, A. L., & Kallick, B. (2000). *Habits of mind: A developmental series.* Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R. (2000). *Designing a new taxonomy of educational objectives.* Thousand Oaks, CA: Corwin Press, a Sage Publications Company.