



# Measuring student success skills

## A review of the literature on analytical thinking

Analytical thinking is a vital cognitive skill for helping students to thrive in the information age. It involves breaking down complex concepts, problems, systems or processes into parts, examining those parts and understanding how they relate to the whole. In an era defined by rapid technological advancements, economic globalization and societal complexities, analytical thinking skills are paramount to career success. According to the World Economic Forum's *Future of Jobs Report 2023*, employers rank analytical thinking as the most important skill for workers.



### What is analytical thinking?

Analytical thinking is a cognitive process that consists of identifying and decomposing a complex concept, problem, system or process into parts; examining those parts and their distinct characteristics or functions; and communicating or articulating how the parts relate to the whole.

## Is analytical thinking generic or domain specific?

While analytical thinking has domain-general aspects, it is necessarily connected to specific objects of thought. As a result, researchers have argued analytical thinking can only be developed through domain-specific content. Since what counts as evidence varies across domains, general analytical thinking skills are necessary but insufficient for enabling analysis within a specific discipline. Context and content inform which analytical skills are more or less important and how an individual can apply them.

## How do children develop analytical thinking over time?

Three developmentally malleable mechanisms influence children's ability to engage in analytical thinking and other types of complex thinking: executive function, short-term and working memory, and knowledge acquisition.

- **Executive function:** executive function represents skills required to control one's emotions, focus one's thoughts and manage one's behaviours while carrying out a learning task. Executive function skills develop rapidly in early childhood and continue to develop throughout childhood.
- **Short-term and working memory:** the ability to reason analytically is limited by working memory capacity. As a child develops, short-term and working memory increases, thereby expanding the child's analytical thinking ability.
- **Knowledge acquisition:** within a domain of study, foundational knowledge of a base problem becomes essential in understanding and analysing the structure of a novel problem. As knowledge develops, so does the ability to apply analytic thought to decisions and problems.

## How is analytical thinking influenced by culture?

Research indicates that the emphasis placed on analytical thinking varies across cultures, with Western cultures tending to prioritize it more than other cultures. As a result, educators should consider how students' cultural backgrounds might influence their approach to analytical tasks. However, it is important to recognize that there is also within and between cultural variation as well as individual variation in levels of analytical thinking.

## What does the research say about effective analytical thinking instructional strategies?

Both domain-general and domain-specific instructional approaches appear to demonstrate promise for improving analytical thinking skills. However, research examining the effects of instruction on analytical thinking as a distinct construct is sparse. Further research is needed to explore the specific nature of analytical thinking within different domains and to establish more conclusive evidence on the effectiveness of instructional approaches.

## How can analytical thinking be measured and assessed?

Standardized tests and performance-based assessments are commonly used to measure and assess analytical thinking, but there are challenges in defining and assessing it due to varying definitions and mediating factors. It is important to gather information from multiple sources and measures when making inferences about a student's analytical thinking skills and abilities. When used together strategically, standardized and performance-based assessments can offer a more holistic and nuanced assessment of an individual's analytical thinking skills.

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This summary was developed by Emily VanderKamp. A copy of the full report is available at: [www.ibo.org/en/research/](http://www.ibo.org/en/research/). For more information on this study or other IB research, please email [research@ibo.org](mailto:research@ibo.org).

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