

Education researchers at Pearson teamed up with the Partnership for 21st Century Learning to conduct a review of the research literature on teaching and assessing critical thinking in K-12 and college classrooms. What follows is a summary of the most significant findings.

### Why Is Critical Thinking Important?

Critical thinking is identified as an important skill that can lead to success in college as well as the workforce. The P21 Framework for 21st Century Learning includes critical thinking as one of the 4Cs, along with creativity, collaboration, and communication. Research suggests that a focus on developing critical-thinking skills is important for several reasons:

- People with better critical thinking are more prepared for the workforce.
- Critical-thinking skills can predict academic success in college.
- Critical thinking has been identified as a crucial skill for college graduates and employers.
- Training students in critical-thinking skills can improve academic outcomes related to writing and argumentation.
- Greater levels of critical thinking are associated with improved quality of life.

### What Does Good Critical Thinking Look Like?

Many frameworks for critical thinking exist. Broadly, critical thinking is defined as a multifaceted skill that involves problem-solving in the face of ill-defined information. Based on the literature, Pearson has defined critical thinking as consisting of four core skills:

- 1. systems analysis:** the ability to determine the relationship between variables in a system;
- 2. argument analysis:** the ability to draw logical conclusions based on data or claims;
- 3. creation:** the ability to construct a strategy, theory, method, or argument based on a synthesis of evidence (the artifact that is created goes beyond the information at hand);
- 4. evaluation:** the ability to judge the quality of procedures or solutions. Evaluation involves criticism of a work product using a set of standards or specific framework.

### How Can I Teach Students to Think Critically?

Like any skill, critical thinking must be taught explicitly. Educators can no longer assume that simply giving students ill-defined problems is enough to support learning. Rather, instructors should engage in appropriate amounts of direct instruction, teaching students what good critical

thinking looks like in terms of desirable behaviors and useful strategies for solving ill-defined problems. Students must also have opportunities to practice their critical-thinking skills with instructor support and to receive feedback on their performance. Instructors should also consider use of problem-based and collaborative approaches to learning, as these have been associated with gains in critical thinking.

## How Should I Design Critical-Thinking Activities for My Classroom?

When designing activities for teaching and assessing critical thinking, it is important to consider all four skills—systems analysis, argument analysis, creation, and evaluation—and to design activities that are accessible to students across varying ability levels. Different types of tasks require differing amounts of each skill. Thus, task demands—what students are asked to do—should be carefully designed to correspond to a specific skill or set of skills.

For example, if the goal is to teach argumentation, teachers should employ tasks that require a student to draft and write an argument based on a set of information provided to the student (e.g., other arguments, data). Similarly, if the goal is to teach evaluation, the student should be provided with a work product to evaluate and produce documentation regarding the evaluation (e.g., written report, spreadsheet). Teachers should design classroom assessments

by matching learning objectives to problem types that are well aligned to the target disciplines of instruction. In addition, educators should consider using concept-mapping activities, simulations, and structured argumentation exercises to foster systems and argument analysis skills as these have proved to be effective in the literature.

## How Should I Evaluate Students' Critical-Thinking Skills?

In order to assess all skills in critical thinking, educators should collect a mix of evidence from critical-thinking activities. Evidence can come from first-hand observations, work products from artifacts (e.g., writing samples, concept maps) or real-time performance data from simulations. Recent advances in technology can supplement observations by enabling real-time capturing and automated scoring of these aspects of writing and systems analysis.

When possible, feedback around performance should be provided at both the skill level (e.g., argument analysis) as well as around the task (e.g., does the student make logical conclusions in the argument?). Providing both these types of feedback can ensure the student knows how they are progressing in critical-thinking instruction.

The main conclusions and implications of the research for classroom practice are as follows:

Conclusion	Recommendation
Critical-thinking skills are highly sought after by employers and are associated with positive outcomes in many aspects of life.	Educators should include critical-thinking skills in their teaching.
Critical thinking involves the skills of argument analysis, systems analysis, creation, and evaluation.	Educators should target each of these aspects of critical thinking in their instruction.
Teachers who have participated in extensive professional development in critical thinking have students who are better at critical thinking.	Schools and institutions should provide professional-development resources to teach critical thinking in specific disciplines.
Models that explicitly teach critical thinking as part of teaching a specific discipline are effective.	Educators should situate explicit critical-thinking instruction in specific disciplines where applicable.
Problem-based learning, scaffolded practice, and collaborative learning approaches may be effective in promoting critical thinking.	Educators should consider using problem-based learning, scaffolded practice, and collaborative learning approaches to teaching critical thinking.
Activities such as concept maps, simulations, and structured argumentation practice have been shown to be effective forms of critical-thinking instruction, especially for systems and argument analysis.	Educators should consider using concept-mapping activities, simulations, and structured argumentation exercises to foster systems and argument-analysis skills.
Problem types can be useful to help create critical-thinking assessments.	Educators should use the problem types as templates to help design or select appropriate critical-thinking assessments.
There are varying forms of feedback to foster learning in critical-thinking activities.	Instructors should provide feedback on student performance at both the skills level and at the evidence level to scaffold learning of critical-thinking skills.