

**SKILLS
FOR LIFE**
SERIES

PROBLEM SOLVING

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What is Problem-Solving?

Problem-solving skills involve the ability to analyze the elements at play in a problematic situation, formulate viable solutions based on information or evidence, and choose one of them. Some researchers consider how a person confronts an uncertain situation, rather than what solution is adopted, as the basis of problem-solving. Problem-solving skills include the ability to collaborate with other members of a group to confront a problematic situation.

Even though there are multiple ways to characterize problem-solving skills, the most common descriptors include the following:

- ▶ Individual problem-solving
- ▶ Collaborative problem-solving

Individual problem-solving

- ▶ Identifying a problem that requires a solution, defining and representing the problem, investigating potential solutions and alternative approaches, implementing strategies to solve the problem, and assessing the results of these actions
- ▶ Analyzing information and adapting it to a specific goal
- ▶ Using various types of reasoning (systematic, inductive, deductive, etc.)
- ▶ Using systemic thinking to make decisions and judgments to solve problems
- ▶ Interacting with the task environment and adapting to its nature to collect, integrate, and organize information; effectively apply knowledge to solve problems and make predictions
- ▶ Using both traditional and innovative methods to solve problems
- ▶ Evaluating evidence and arguments, synthesizing and connecting information and arguments, and analyzing and evaluating alternative points of view

Collaborative problem-solving

- ▶ Working as part of a team to identify a problem, define and represent it, investigate potential solutions and alternative points of view, implement the solutions, and assess the impact of the team's decisions
- ▶ Interacting or collaborating with others to solve a problem by combining knowledge, efforts, and skills
- ▶ Being a responsible team member and recognizing each team member's role in solving problems
- ▶ Being aware of the differences you may encounter when working with others
- ▶ Being able to participate in the group, take perspective of others, effectively organize tasks and communicate with team members, and build knowledge
- ▶ Collaborating and prioritizing group success over individual success

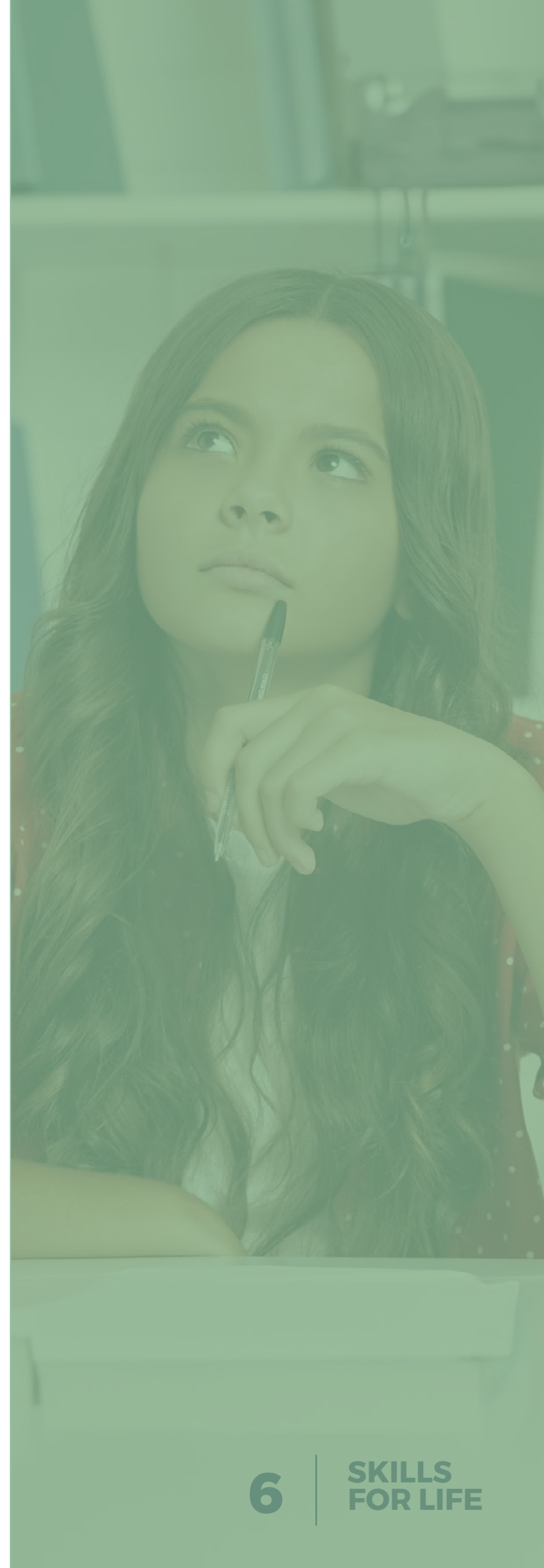
As a citizen of the 21st century with problem-solving skills, you should be able to do the following:

- ▶ Identify problems with no obvious solution and turn them into objectives
- ▶ Identify an objective and find the most effective way to achieve it
- ▶ Investigate potential strategies to solve the problem and forecast outcomes
- ▶ Determine the source of the problem and devise effective solutions
- ▶ Employ methods or techniques to solve problems effectively, either individually or collectively
- ▶ Observe, analyze, evaluate, and interpret both the problem and the information available to solve it
- ▶ Examine your problem-solving methods and draw conclusions from your experiences
- ▶ Identify potential barriers to problem-solving
- ▶ Consider, examine, and discuss available resolution strategies with your peers
- ▶ Interact effectively with your peers to solve a problem as a group by pooling resources, knowledge, and skills

Why Problem Solving?

Problem-solving skills provide a basis for future learning, for effective participation in society, and for engaging in personal activities. They are even needed to guarantee the development of other 21st century skills, such as digital, socioemotional, and green skills, among other. Moreover, the literature shows that increasing problem-solving skills decreases depression and aggression, while it improves prosocial behaviors (Webster-Stratton et al., 2001; Young et al., 2006).

Problem-solving skills are essential to succeed at school, since they relate to academic performance in general. As students develop these skills their learning outcomes also improve. The literature has shown a strong relationship between performance in foundation skills (e.g., math, reading, science) and problem-solving skills (OECD, 2013, 2017). Both individual and collaborative problem-solving skills are also key for successful employment, as part of people's daily work is to find solutions and they are often called to work collaboratively with peers.



How to develop Problem-Solving Skills?

Numerous studies have shown that all developmental age groups, beginning at four years old, can learn problem-solving skills (Bird et al., 2018; McGoldrick et al., 2013; Polyzois et al., 2010; Seymour, 2013; Webster-Stratton et al., 2001). Progressive teaching methods—such as problem-based learning, inquiry-based learning, and individual and group project work—can be used to foster deep understanding and prepare students to apply their knowledge in novel situations (OECD, 2013). Among specific programs that effectively improved problem-solving skills are:

- ▶ The Incredible Years Dinosaur Social Skills and Problem-Solving Child Training Program
- ▶ The IDEAL Framework to Promote Problem-Solving
- ▶ Inquiry and Problem-Based Pedagogy (IPP)



The Incredible Years Dinosaur Social Skills and Problem-Solving Child Training Program

Dinosaur School, started in 2004, is a classroom-based program that fosters social skills and problem-solving in children ages three to eight from forty Head Start classrooms in the United States (Webster-Stratton & Reid, 2004). Teachers are trained in classroom management and participate in planning meetings every week; they then use these lesson plans to teach specific skills at least two to three times a week.

One of the units of this program focuses on problem-solving. In this unit, children learn a seven-step process for problem-solving: (1) How am I feeling, and what is my problem? (i.e., define the problem and articulate feelings) (2) What is a solution? (3) What are some more solutions? (i.e., brainstorm solutions or alternative choices) (4) What are the consequences of those solutions? (5) What is the best solution? (i.e., is the solution safe and fair, and does it lead to positive feelings?) (6) Can I use my plan? and (7) How did I do? (i.e., evaluate the outcome and reinforce efforts).

To improve learning, each unit combines behavioral, emotional, and cognitive elements. As a result, activities include writing or performing in a problem-solving play, “fishing” for answers using a magnetized fishing pole, and cooperating in a group to produce enough answers to get into “Wally’s Problem-Solving Detective Club.” Children from 40 Head Start classrooms in the United States who participated in this program in 2004 demonstrated noticeably greater prosocial reactions in conflict situations (Webster-Stratton & Reid, 2004).

The IDEAL Framework to Promote Problem-Solving

IDEAL is an acronym summarizing each component in a problem-solving model (Figure 1) designed to increase creativity and learning (Bransford & Stein, 1993). The first step identifies problems as opportunities to do something creative, so a problematic situation is reframed as the potential to improve one's circumstances. The second stage involves defining multiple goals to solve the problem, and the third step requires listing any options or strategies to achieve those goals. After exploring the strategies under consideration, the problem solver should anticipate the effects of using each of them and take action. Finally, the fifth step involves looking at the actual effects of the strategy and evaluating whether or not it helped to solve the problem. This framework can be used flexibly, based on students' specific needs or available resources; as a result, the whole cycle can be repeated several times until a satisfactory solution is achieved. The IDEAL framework has been used successfully in school settings in Indonesia (Setyadi et al., 2019; Sari et al., 2023).



Figure 1. Components of the IDEAL framework for problem-solving




A photograph of three young students, two girls and one boy, sitting at a table in a classroom. They are focused on a project involving electronic components and wires. The student on the left is a girl with long dark hair wearing a light blue jacket. The student in the middle is a girl with dark hair wearing a pink and grey striped sweater. The student on the right is a girl with dark hair in a bun wearing a pink shirt. The background is a blurred classroom setting with other students and desks.

Inquiry and Problem-Based Pedagogy (IPP)

IPP is a pedagogical approach that promotes an active role for students in the learning process through feasible tasks carried out with social interaction. The IDB found that IPP is effective in promoting problem-solving skills through 10 field experiments conducted in Argentina (fourth graders), Belize (sixth graders), Paraguay (preschoolers), and Peru (preschoolers and third graders) between 2009 and 2015 (Bando et al., 2018). The IPP increased students' math and science performances after as early as seven months of working with this approach.

The central elements of IPP are: (1) instruction based on core concepts developed over several lessons, (2) classes organized around inquiry and problem-solving opportunities, and (3) use of structure and close guidance to help student complete complex activities. Teachers, therefore, play a key role in this type of approach.


In IPP classrooms, teachers pose research questions and guide students through formulating and testing hypotheses to explore these questions. Students gain knowledge by working together to solve real-world, authentic challenges, to develop explanations, and to share ideas. They learn how to look for information from a variety of sources, including text-based materials and data they collect themselves, and how to solve problems by working collaboratively to conduct investigations.

A vertical image on the left side of the page shows a hand holding a Rubik's cube and another hand writing on a notepad. The background is a light green gradient.

How to assess and measure Problem-Solving?

As with many other skills, there is more than one way to measure problem-solving skills. They could be measured using the person's perception (self-reporting) about the degree of development of such skills, or by a person's performance in problematic situations (performance-based evaluation).

To measure the perception of problem-solving skills, questionnaires and interviews can be used. One of the most popular tests is the SPSI-R (Social Problem-Solving Inventory-Revised; Maydeu-Olivares & D'Zurilla, 1995; D'Zurilla et al., 2002). It was created in tandem with a problem-solving intervention to evaluate a person's cognitive, affective, behavioral, and social responses to real-life problem-solving situations. The instrument measures type of orientation to problems, as well as problem -solving style.



On the other hand, performance-based assessment uses real or hypothetical problematic situations to measure problem-solving skills. In this approach, performance can be measured using scenarios that either have multiple options with only one correct answer or that require the subject to write out the answer. These types of assessments can also be conducted by requiring the subject to solve a specific problem; the proposed solution is then evaluated or rated based on a certain quantitative or qualitative framework (D’Zurilla et al., 2002).

Finally, it is worth mentioning that PISA assessed individual problem-solving in 2012 and collaborative problem-solving in 2015. A free interactive platform with questions from PISA 2015 is available [online](#) in Spanish. Moreover, given the relevance of problem-solving skills for job performance, many human resources companies offer online tests—such as the Mettl Problem-Solving Aptitude Test (Mercer-Mettl, 2023), the ID-Problem-Solving Test (HRID, 2023), and the Creativity & Problem-Solving Aptitude Test (Creative Organizational Design, 2019)—as part of their hiring processes to select the most suitable applicants.

RESOURCES:

Video. [The Wello Water Wheel Story](#)

Article. [La estudiante que en menos de una semana resolvió un famoso problema matemático que llevaba medio siglo sin respuesta.](#)

Website. [EXTREME: design for extreme affordability.](#)

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