In the modern world, most problems—whether they be at work, at home, or in communities—require that teams work together to find solutions. Combining idiosyncratic knowledge of people to achieve common goals is the very essence of collaborative problem solving (CPS). But education and training in CPS—both in schools and the workplace—has not kept up with the demands for those collaborative skills. Analyzing this gap and the characteristics of CPS provides an opportunity to identify strategies to improve CPS education and assessment, with psychological scientists playing a critical role.

In this issue of *Psychological Science in the Public Interest* (Volume 19, Issue 2), Arthur C. Graesser (Department of Psychology and Institute for Intelligent Systems, University of Memphis) and colleagues examine the research and theory on CPS and identify challenges and opportunities for the development of research on, assessment of, and training in CPS. Graesser’s coauthors are Stephen M. Fiore (Department of Philosophy and Institute for Training & Simulation, University of Central Florida), Samuel Greiff (Cognitive Science and Assessment, University of Luxembourg), Jessica Andrews-Todd (Educational Testing Service, Princeton, New Jersey), Peter W. Foltz (Pearson, Boulder, Colorado and
The authors argue that the complexity of most problems in the modern world makes them unsolvable by a single individual; instead, a team is required to solve them. However, in 2017, the Organisation for Economic Co-operation and Development (OECD) reported the results of an international assessment of CPS as part of the Program for International Study Assessment (PISA), revealing that only 8% of students tested on CPS skills performed at a high level of proficiency. Moreover, a 2012 survey by the American Management Association showed that high-level managers believe newly minted college graduates do not have the skills needed for collaboration, even though they feel they can effectively work in a team. These results support the need for incorporating CPS training in curricular activities and developing a pedagogical approach to CPS, informed by psychological science.

CPS requires both cognitive problem-solving skills and social collaborative skills, according to most CPS theoretical frameworks. In CPS, a group’s first goal is to solve a novel problem, which an individual is unlikely to achieve alone. The quality of the solution can be evaluated during problem solving and is visible to the group members, who take on different tasks based on their individual knowledge to solve different aspects of the problem. CPS also requires interdependency among group members, whose different tasks and resources are essential to solving the problem. However, CPS also shares some features with other forms of collaboration (e.g., collaborative learning or decision making)—it benefits from a division of labor, the presence of multiple sources of knowledge, and interaction between group members, and it might not be optimal when communication is inefficient, when conflicts arise, or when group members feel unappreciated or diffuse their responsibility to others.

Graesser and coauthors encourage the use of research findings in organizational and educational settings to inform possible approaches to CPS in team training. They suggest that computer agents, which can be used to track and analyze conversation during collaboration, can be robust training tools. Emerging intelligent tutoring systems could automatically track the contributions of team members and the group as a whole, and provide timely feedback and recommendations for improvement.

Collaborative Problem Solving: Social and Developmental Considerations

By Mary Gauvain, University of California, Riverside

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Some promising components of CPS training are (a) immediate and regular feedback along with suggestions for improvement, (b) regular communication of ongoing work, (c) complex and real-world problems to solve, (d) reflection on individual and group performance and strategies, and (e) modeling
from an instructor.

Working together, psychological scientists, educational researchers, computer scientists, and other experts can foster the training of CPS and its assessment. This development is likely to help address current shortfalls of academic preparation in CPS and better meet the needs of the modern workplace and community, where individuals must often work together to solve novel problems using their CPS skills.

In an accompanying commentary, Mary Gauvain, who is an expert in cognitive development, including the development of problem solving, and head of the Cognitive Development Laboratory at University of California, Riverside, discusses the social and developmental aspects of collaborative problem solving (CPS). She highlights what has been learned about the social dynamics of collaborative learning in the classroom that may inform the social aspects of CPS and exposes the importance of a developmental perspective in research on CPS (e.g., developmental status influences what someone learns from collaborative activities). Like Graesser et al., Gauvain remarks on the value of theory in guiding work on CPS but observes the need for a deeper theoretical account of cognition in social contexts. Gauvain reiterates Graesser et al.’s idea of how psychological scientists might contribute to the training of CPS, an underdeveloped but crucial skill for the modern workplace and community.

About the Authors (PDF, HTML)