Collaborative Problem Solving Rubric
Mathematical Thinkers Like Me R&D Team
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## Collaborative Problem Solving Rubric

*Renninger, K.A., Benke, G., Böheim, R., Corven, J., De Dios, M.C., Hogan, M.R., Kyaw, M.H., Michels, A.G., Nakayama, M., Nunez, P.T., Werneck, H., & Yared, F. (2025).*

This rubric provides a qualitative tool to measure the ways in which students took advantage of opportunities to collaborate with their peers when working on open-ended problem solving.

**Purpose**

- The Collaborative Problem Solving (CPS) rubric attends to student engagement in shared processes for knowledge construction, emphasizing the idea that collaboration requires a different type of cognition than when working individually.
- Collaborative Problem Solving is operationalized in this rubric via three stages:
    - "Participation: individual behaviors in which a student may act according to their own goals and methods, but their goals and methods are dependent on and shaped by other people;
    - Cooperation: group behaviors in which a common goal is explicitly established, but the methods to achieve it are not joint;
    - Collaboration: group behaviors in which goals and methods are shared and jointly enacted" (Renninger, et al., p. 70)

**Measure Details**

- The qualitative rubric consists of 16 items across individual and group-level collaborative problem solving activity (CPS):
    - Participation: 5 items
    - Cooperation: 4 items
    - Collaboration: 7 items
- All items are measured on a 4-point scale, ranging from -1 to +1. After items are scored for the selected math moment, average scores for each type of CPS can be calculated.
- This rubric was developed for use with middle school students.

**Contribution to the Field**

- Research continues to explore the process of problem-solving in mathematics teaching and learning. Yet, while classroom contexts typically involve collaboration, especially on open-ended tasks, research has primarily focused on understanding individual engagement in problem-solving activity. This rubric articulates how students' cognitive and behavioral engagement may occur at both the individual and group level throughout a collaborative learning process. Further, this rubric advances our understanding of how this engagement may change throughout the problem-solving process, expanding the typical measurement of engagement at static timepoints.
- This qualitative rubric leveraged research-based descriptions of problem-solving activity to construct items focused on identifying the ways students activate and practice their

EF skills in a mathematics learning context. The rubric items each reference its source materials.

## Accessing the Measure

- You may access the measure here:
    - Renninger, K.A., Benke, G., Böheim, R., Corven, J., De Dios, M.C., Hogan, M.R., Kyaw, M.H., Michels, A.G., Nakayama, M., Nunez, P.T., Werneck, H., & Yared, F. (2025). Exploring math moments: Middle-schoolers' phases of problem-solving, executive functions in practice, and collaborative problem solving. *Frontline Learning Research, 13*(2). https://doi.org/10.14786/flr.v13i2.1371
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