



Strategies to Support Problem Solving

Learning to code and create allows all students to develop important problem-solving skills that they can apply to many different aspects of their learning and their lives. These skills include the ability to break down problems into smaller parts, and to draw on both logic and creativity to figure out the best ways to solve them (Lechelt, Zuzanna & Rogers, Yvonne & Yuill, Nicola & Nagl, Lena & Ragone, Grazia & Marquardt, Nicolai. 2018).

Instructional Goals:

- Try different approaches when solving a problem
- Simplify problems
- Identify what works and what doesn't work
- Form and test their hypotheses
- Solve problems that may be hard at first
- Recognize when they are successful and acknowledge contributions of all

Instructional Strategies:

1. Use the guiding questions and prompts to explicitly teach and model for students the steps in the Collaborative Discussion Framework below.
2. Display and remind students to use their Student Tip Sheet when working together.

Collaborative Discussion Framework (CDF):

What are you trying to do?
Do they have or understand the purpose?
Prompt: What is your plan for solving this problem?
What have you tried already?
Restate in steps what they have already done.
Prompt: 1. What did you start with? 2. Why did you choose that sequence, block, etc.? 3. Does that make sense? 4. Can you explain this part to me?

What else do you think you can try?
Brainstorm, encourage students to take a chance.
Prompt: 1. Is this like another problem you have solved? How? 2. Can you use your previous solution to help you solve this one? 3. Is there a part that works? 4. Where does the plan stop working? 5. Do you see any patterns that may help you?
What would happen if?
Come up with some possible solutions and predict outcomes. Test predictions.
Prompt: 1. What do you think will happen? Let's try. 2. What would happen if you changed...? Let's try.
Celebrate and Share!
Take charge of celebrating one's excitement.
Prompt: 1. Did your plan work? 2. Is this what you wanted to happen? 3. _____'s ideas worked! 4. We worked hard to _____. 5. Who do you want to show?

Adapted with permission from:

Lash, T., Jeong, G., Wherfel, Q., & Israel, M. (2017). Helpful strategies for peer collaboration during K-12 computer science instruction. Project TACTIC: Teaching All Computational Thinking through Inclusion and Collaboration. Retrieved from of Illinois, Creative Technology Research Lab website: <https://CTRL.education.illinois.edu/TACTICal/Collaboration>

References:

"Collaborative Discussion Framework." [Ctrl-Shift], Reese@Illinois.edu, 3 Apr. 2015, ctrlshift.mste.illinois.edu/2015/04/03/collaborative-discussion-framework/.

Lechelt, Zuzanna & Rogers, Yvonne & Yuill, Nicola & Nagl, Lena & Ragone, Grazia & Marquardt, Nicolai. (2018). Inclusive Computing in Special Needs Classrooms: Designing for All. 1-12. 10.1145/3173574.3174091.