

A Problem-Solving Model and Coding

How coding incorporates George Polya's four-step model for solving math problems

Understand the Problem (the exploratory stage)

In this stage, students may:

- ✓ Ensure they can perform the calculations required to solve the problem (i.e., pencil-paper practice of simple problems provided by the teacher)
- ✓ Spend some time reading the problem and restating it
- ✓ Consider what information is being given and the information that needs to be determined (i.e., input/output values)
- ✓ Decide what variables are required
- ✓ Talk about the problem to understand it better

Make a Plan

In this stage, students may:

- ✓ Give variables a meaningful name
- ✓ Write out the algorithm (step-by-step instructions) in English
- ✓ Decide how the calculations will be used in the program
- ✓ Write out the equations/calculations required
- ✓ List the questions that will be asked of the user to obtain the information required
- ✓ Determine what information will be outputted
- ✓ Discuss with others to clarify which strategies would work best
- ✓ Prepare a flow-chart to show plan

Carry Out the Plan

In this stage, students may:

- ✓ Design the interface
- ✓ Declare necessary variables (for known and unknown information), give each a meaningful name
- ✓ Write the code, including necessary calculations
- ✓ Debug (revise or apply different strategies as necessary)
- ✓ Document (comment) their code in English
- ✓ Share results

Look Back at the Solution

In this stage, students may:

- ✓ Continue to debug
- ✓ Check reasonableness of answer by testing the program with different input/data/values
- ✓ Review the method used – Did it make sense? Is there a better or more efficient way to solve the problem?
- ✓ Consider extensions or variations (teacher may suggest extension to program or students come up with their own)
- ✓ Explain their code

Retrieved and adapted from:

Ministry of Education, The Ontario Curriculum, Grades 1-8, Mathematics, 2005

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