WHAT IS A PROBLEM STATEMENT?

A problem statement is a clear description of a challenge or goal that learners need to solve. It presents a situation that requires computational thinking and/or programming to resolve.

A problem statement tells learners what needs to happen, but not exactly how to make it happen. Learners must figure out the solution themselves.

When problem statements are well-crafted, learners stop seeing lessons as tasks to complete and start seeing themselves as capable problem-solvers who can help others - a powerful foundation for lifelong learning in computer science and beyond.

In Coding and Robotics, we solve problems!

The Structure of a Good Problem Statement - Essential Elements:

- **A Clear Goal/Challenge**
  What needs to be achieved?
- **Context or Scenario** (when appropriate)
  Why does this matter? Who needs this solution?
- **Constraints or Rules**
  What are the limitations or requirements?
- **Success Criteria** (sometimes implicit)
  How will we know the problem is solved?

WHY USE PROBLEM STATEMENTS?

1. Develops Computational Thinking
Problem statements require learners to:

- **Decompose** (break the problem into smaller steps)
- **Recognize patterns** (see **what** repeats or is similar)
- **Abstract** (focus on important information)
- **Create algorithms** (design step-**by**-step solutions)
- **Debug** (test and fix when it doesn't work)

2. Promotes Active Learning
When faced with a problem, learners must:

- Think **critically**
- Make **decisions**
- Try different **approaches**
- Learn from **mistakes**

This is much more powerful than passively following instructions.

3. Builds Problem-Solving Skills
Real programmers and engineers don't get told exactly what to do - they're given problems to solve. Problem statements prepare learners for authentic problem-solving.

4. Encourages Multiple Solutions
Good problem statements often have more than one correct solution. This:

- Values different **thinking** approaches
- Promotes **creativity**
- Enables **differentiation** (some solutions are simpler, others more complex)
- Creates opportunities for rich discussion: "How did you solve it? How is yours different from mine?"

5. Makes Learning Meaningful
Problems give **context** and **purpose** to coding and robotics. Instead of learning "what is a loop," learners think "I need to make this action repeat - how can I do that?"

6. Aligns with Real-World Application
In real life, we don't follow recipes - we solve problems. Problem statements mirror how coding and robotics are actually used in the world.

GRADE R TERM 1 CODING & ROBOTICS - PROBLEM STATEMENTS

Problem statements provided in Grade R lesson plans are short 'stories' – with main idea bolded.

LEARNER PROBLEM STATEMENTS

The following are short versions of the 'stories' for introducing lessons to learners – use learner friendly font (increase font for use)

Week 1: New Friend Needs Help

Our new friend Thembi doesn't know where things are in our classroom. Can you help show her where to find the blocks, books, and art supplies? Let's walk and point to help Thembi!

Week 2: Help Robot Boppy

Oh no! Robot Boppy is confused. He can only follow patterns to move. If we don't give him patterns, he'll spin in circles! Can you help by making patterns with your body and then using arrow cards?

Week 3: Sam Snail's New Home

Sam the Snail needs to get to the Creative Corner, but he can only move when we give him arrow patterns! Should he go forward-forward-right or forward-left-forward? Let's make an arrow pattern path!

Week 4: Luna Kitten Lost

Luna the Kitten is lost in the garden! She needs to go past the flowers, around the tree, and through the gate to get home. Can you help Luna remember the steps in the right order?

Week 5: Robot Rosie Sorts Blocks

Robot Rosie's blocks are all mixed up! She can only use blocks that are the same in one way - same color, shape, or size. Can you find which block doesn't belong in each group?

Week 6: Making Friendship Cards

It's craft time! We're making friendship cards with a special pattern: fold-cut-glue-fold-cut-glue. Maya isn't sure what comes next. Can you help her figure out the pattern?

Week 7: Teddy's Bedtime

Little Teddy is sleepy but can't remember his bedtime steps! He needs to: bath, brush teeth, put on pajamas, and get into bed. Can you follow the arrows to help Teddy do each step in order?

Week 8: Sipho's Robot Contest

Sipho wants to build a robot for the contest, but his instructions got ripped! He has triangles, squares, circles, and rectangles. Can you help him build the robot from top to bottom?

Week 9: Snack Time Recipe

We're making Rainbow Fruit Kabobs! Chef Palesa's recipe steps got mixed up: wash hands, get stick, add a strawberry, add a pineapple, add grapes. Can you put them in the right order?

Week 10: Andrew's Valentine Card

Andrew wants to make a Valentine's card for his grandma. Should he cut first or glue first? Let's help Andrew find all the supplies and figure out the steps in the right order!

What Makes a Good Problem Statement for Foundation Phase?
A high-quality problem statement for Grade R learners should:

- **Be age-appropriate**: Use simple language and familiar contexts
- **Create empathy**: Feature relatable characters or situations
- **Be specific**: Clearly define what needs to be accomplished
- **Motivate learning**: Create genuine interest in solving the problem
- **Connect to real life**: Use scenarios children can relate to
- **Support learning objectives**: Directly address the competencies being taught
- **Be scaffolded**: Provide appropriate challenge without overwhelming
- **Encourage agency**: Make learners feel they can help/solve the problem

Recommendations for Implementing Improved Problem Statements
Introduce Problems Dramatically

- Use props, voices, or puppets when presenting problem statements
- Build anticipation: "Oh no! We have a problem today!"
- Make it feel urgent but not stressful

Keep Characters Consistent When Possible

- Consider having 2-3 recurring characters throughout term
- Examples: "Robot Rosie" could appear in multiple weeks, "Boppy the Robot" could return
- Builds familiarity and investment

Allow Learner Input

- After presenting problem, ask: "What do you think we should do first?"
- Let learners suggest solutions before diving into activity
- Validate their thinking even if guiding toward intended approach

For Teachers:

- **Read problem statement with enthusiasm** - Your energy matters!
- **Use different voices for different characters**
- **Pause for student reactions** - Let them process the problem
- **Scaffold as needed** - Some students may need problems broken down
- **Celebrate all attempts** - Focus on problem-solving process, not just answers

For Assessment:
Use problem statements to assess:

- Can learners identify what the problem is?
- Can they suggest appropriate solutions?
- Do they connect problem to learned concepts?

- Can they explain their problem-solving process?

Remember
Effective problem statements are the heart of inquiry-based learning. By improving problem statements to be more engaging, specific, and aligned with learning intentions, we create authentic reasons for Grade R learners to engage with coding and robotics concepts.

Problem statements:

- Create emotional investment through relatable characters
- Provide clear, achievable goals
- Embed computational thinking language naturally
- Connect practical activities to theoretical concepts
- Respect learner agency and capability
- Build progressively in complexity
- Reflect real-world applications