

Assessment Ideas

Creating Learning Goals and Success Criteria with the Ontario Science Curriculum

Creating your assessment tool, learning goals, and success criteria from the top down ensures validity and reliability. Here are some examples with the grade 5 curriculum.

1. Start with the MOE document and Overall Expectations:



OVERALL EXPECTATIONS

By the end of Grade 5, students will:

1. evaluate the social and environmental impacts of processes used to make everyday products;
2. conduct investigations that explore the properties of matter and changes in matter;
3. demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change.

2. Unpack Knowledge and Skills:

Looking at the specific expectations, what are the learning concepts, principles, and information, application to a context:

Overall Expectation	UNPACKED knowledge and skills
demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change.	<ul style="list-style-type: none">● matter is all around us - anything that has mass and takes space● matter is made up of particles called molecules● 3 different states are solid, liquids, and gas<ul style="list-style-type: none">○ Solids have definite volume and hold their shape○ Liquids have definite volume and take the shape of the container they are in○ Gases have no definite volume and take the shape of the container● states can change and we can see it happen all around us

3. Turn the list of Knowledge and Skills into Learning Goals:

What do YOU want students to know or be able to do? (e.g., We are learning to ...)

UNPACKED knowledge and skills	Learning Goals
<ul style="list-style-type: none"> ● matter is all around us - anything that has mass and takes space ● matter is made up of particles called molecules ● molecules of matter can be in different states ● 3 different states are solid, liquids, and gas <ul style="list-style-type: none"> ○ Solids have definite volume and hold their shape ○ Liquids have definite volume and take the shape of the container they are in ○ Gases have no definite volume and take the shape of the container ● states can change and we can see it happen all around us ● etc... 	<p>We are learning...</p> <ul style="list-style-type: none"> ● That the world around us is composed of matter, which is composed of tiny particles that have different states ● Solid, liquid, and gas are 3 states of matter ● We can change the state of matter by changing the temperature ● There are processes that occur in nature and at home that demonstrate these changes

4. Turn the Learning Goals into Success Criteria:

- Written from their perspectives
- How do students know they are successful?

Learning Goals	Success Criteria
<p>We are learning...</p> <ul style="list-style-type: none"> ● That the world around us is composed of matter, which is composed of tiny particles that have different states ● Solid, liquid, and gas are 3 states of matter ● We can change the state of matter by changing the temperature ● There are processes that occur in nature and at home that demonstrate these changes 	<p>I am able to...</p> <ul style="list-style-type: none"> ● represent water as tiny particles ● create a program that animates water as solid, liquid, and gas ● show a relationship between the temperature and state of matter <ul style="list-style-type: none"> ● show that a fridge will freeze water into a solid, that I can obtain liquid water from a room faucet , and that boiling water in a kettle changes it to a gas

Success criteria are essential for two things:

1. The giving of descriptive feedback - Assessment FOR and AS learning!
2. The development of an assessment tool
 - The Achievement Chart is NOT an “Assessment Tool”
 - It’s not specific enough
 - The Achievement Chart IS a framework for assessment

ACHIEVEMENT CHART – LANGUAGE, GRADES 5 – 8

Category	Level 1	Level 2	Level 3	Level 4
Knowledge and Understanding – Subject specific content acquired in each grade. Knowledge and the comprehension of its meaning and significance (as understanding)				
	The student:			
Knowledge of content (e.g., forms of text; dialogue; expository, speaking and listening; elements of topic; morphology; orthography)	demonstrates limited understanding of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates thorough knowledge of content
Understanding of content (e.g., concepts; their context; relationships among facts; their complexity)	demonstrates limited understanding of content	demonstrates some understanding of content	demonstrates considerable understanding of content	demonstrates thorough understanding of content
Thinking – The use of critical and creative thinking skills and/or processes				
	The student:			
Use of thinking skills (e.g., generating ideas; gathering information; focusing research; organizing information)	uses planning skills with limited effectiveness	uses planning skills with some effectiveness	uses planning skills with considerable effectiveness	uses planning skills with a high degree of effectiveness
Use of processing skills (e.g., making inferences; comparing/analyzing; detecting bias; synthesizing; evaluating; forming conclusions)	uses processing skills with limited effectiveness	uses processing skills with some effectiveness	uses processing skills with considerable effectiveness	uses processing skills with a high degree of effectiveness
Use of critical/creative thinking processes (e.g., making inferences; writing process; and evaluate research; organizational; analytical/critical thinking; investigations; research)	uses critical/creative thinking processes with limited effectiveness	uses critical/creative thinking processes with some effectiveness	uses critical/creative thinking processes with considerable effectiveness	uses critical/creative thinking processes with a high degree of effectiveness



5. Match a standard, Learning Goal or Success Criteria to an [achievement chart](#) category:

- Ensure each criterion is:
 - ✓ derived from standards (valid)
 - ✓ understood by student (& teacher)
 - ✓ observable
 - ✓ distinct from each other
 - ✓ able to completely describe the whole learning outcomes that the task is intended to access
 - ✓ able to be described at different levels

Achievement Chart Categories
Knowledge See the world around us composed of matter, which is composed of tiny particles that have different states
Communication Solid, liquid, and gas are three states of matter
Thinking None
Application We can change the state of matter by changing the temperature

5. Create Performance-Level Descriptors:

What does student work look like at each level of quality from high to low in this criterion?

	Level 4	Level 3	Level 2	Level 1
Application We can change the state of matter by changing the temperature	Each state of matter is accurately represented and gives a clear, detailed, and informative view of what is happening in relation to the temperature	Each state of matter accurately represented in relation to the temperature	Some states of matter do not show what happens in relation to temperature	The representation does not help show what happens to matter in relation to temperature

- Start with Level 3 (Provincial Standard) and move up and down
- Exemplars for different levels - does not have to be task specific
- Descriptors that are too specific constrain creativity and metacognitive development
- Be careful of rubrics disguised as directions (too specific) or checklists (either DONE or NOT DONE)
- Be careful of including quantity to describe different levels - quantity > quality
- Evaluative terms should not be used (e.g., excellent, good, fair, and poor)
- Describe student performance in terms that allow for many different paths to success

Example Rubric for Robotics Task - Grade 4 - Pulleys and Gears

	Level 1	Level 2	Level 3	Level 4	Comments
Knowledge and Understanding	Demonstrates a limited understanding of how a pulley and/or gear system allows a small input force to generate a large output force in the context of the robotics task	Demonstrates some understanding of how a pulley and/or gear system allows a small input force to generate a large output force in the context of the robotics task	Demonstrates considerable understanding of how a pulley and/or gear system allows a small input force to generate a large output force in the context of the robotics task	Demonstrates thorough understanding of how a pulley and/or gear system allows a small input force to generate a large output force in the context of the robotics task	
Application	Applies at least four of the robotics skills to solve the problem with limited effectiveness	Applies at least four of the robotics skills to solve the problem with some effectiveness	Applies at least four of the robotics skills to solve the problem with considerable effectiveness	Applies at least four of the robotics skills to solve the problem with a high degree of effectiveness	
	Chooses a solution that makes connections between what you know about robotics, science, and the challenge with limited effectiveness	Chooses a solution that makes connections between what you know about robotics, science, and the challenge with some effectiveness	Chooses a solution that makes connections between what you know about robotics, science, and the challenge with considerable effectiveness	Chooses a solution that makes connections between what you know about robotics, science, and the challenge with a high degree of effectiveness	
	Creates a flow chart that proposes a course of practical action of limited effectiveness	Creates a flow chart that proposes a course of practical action of some effectiveness	Creates a flow chart that proposes a course of practical action of considerable effectiveness	Creates a flow chart that proposes a course of practical action of a high degree of effectiveness	

Thinking	Uses critical / creative thinking processes to program the robot to complete the chosen plan and accomplish the task, with the parameters (time and space), with limited effectiveness	Uses critical / creative thinking processes to program the robot to complete the chosen plan and accomplish the task, with the parameters (time and space), with some effectiveness	Uses critical / creative thinking processes to program the robot to complete the chosen plan and accomplish the task, with the parameters (time and space), with considerable effectiveness	Uses critical / creative thinking processes to program the robot to complete the chosen plan and accomplish the task, with the parameters (time and space), with a high degree of effectiveness	
	Uses processing skills and strategies to test, troubleshoot, and revise the plan, using the equipment respectfully, with limited effectiveness	Uses processing skills and strategies to test, troubleshoot, and revise the plan, using the equipment respectfully, with some effectiveness	Uses processing skills and strategies to test, troubleshoot, and revise the plan, using the equipment respectfully, with considerable effectiveness	Uses processing skills and strategies to test, troubleshoot, and revise the plan, using the equipment respectfully, with a high degree of effectiveness	
Communication	Expresses ideas and information, explaining why and how your solution works, using appropriate scientific and technological terminology with limited effectiveness	Expresses ideas and information, explaining why and how your solution works, using appropriate scientific and technological terminology with some effectiveness	Expresses ideas and information, explaining why and how your solution works, using appropriate scientific and technological terminology with considerable effectiveness	Expresses ideas and information, explaining why and how your solution works, using appropriate scientific and technological terminology with a high degree of effectiveness	

Resources:

Wayne Loo and Andrew Schmidt - Presentation on Coding in the Elementary Grades, TDSB, 2014. Used with permission.

Assessment Checklist and Rubric Suggestions

Learning Goals:

Specific Expectations:

	Consistently	With prompts	Not yet
The student identifies the desired outcome for their design			
The student identifies the related QUALITATIVE observations to that outcome			
The student identifies the related QUANTITATIVE observations to that outcome			
The student uses the vocabulary appropriately			
The technological-design process shows signs that new knowledge was used to improve on the design (especially enabling qualitative and quantitative observations)			

Assessment Checklist

	Consistently	With prompts	Not yet
The student can identify which materials are better (taking into consideration all criteria for success)			
The student has reworked the design or confirmed their choices following the experimental results			
The student follows safety protocols at all times			

OVERALL SUGGESTIONS FOR THE UNIT

General Criteria to look for in Assessment Pieces:

	Consistently	With prompts	Not yet
Can the student use the vocabulary appropriately?			
Does the technological-design process show signs that new knowledge was used to improve on the design?			
Can the student justify choices in their design for criteria success?			

Self-evaluation for design and re-design

Self-evaluation for design and re-design (5= My best effort; 3 = Medium; 1 = Poor effort)	
Were my sketches clear enough for others to understand?	5 4 3 2 1
Did I include written suggestions on my rough sketch?	5 4 3 2 1
Did my product do what I designed it to do? Did my solar oven meet my self-selected criteria?	5 4 3 2 1
If I worked with others, how well did I cooperate?	5 4 3 2 1
If I worked with others, how would I rate my contribution to the product?	5 4 3 2 1

Science and Technology Performance Task (From the Halton District School Board)

CRITERIA	Performance Indicators			
	Level 1	Level 2	Level 3	Level 4
Design Process plan	Develops a plan with limited clarity and a few steps	Develops a workable plan with some clarity and some steps	Develops a clear workable plan, including steps, in a logical sequence	Develops a workable plan and modifies the plan as necessary
Design Process use of materials	Uses tools, equipment, and materials with limited regard to safety	Uses tools, equipment, and materials with some regard to safety	Uses tools, equipment, and materials safely	Uses tools, equipment, and materials safely and appropriately
Design Process use of design process	Demonstrates little use of the design process (plan, build, test, evaluate, communicate)	Demonstrates some use of the design process (plan, build, test, evaluate, communicate)	Uses the design process (plan, build, test, evaluate, communicate)	Uses the design process (plan, build, test, evaluate, communicate) effectively
Model translate plan to model	Translates design plans into a working model, with assistance	Translates design plans into a working model with limited assistance	Successfully translates design plan into a working model based on criteria required	Successfully translates design plan into a working model based on criteria required
Model model performs intended task	Creates model that performs intended function in a limited manner	Creates model with some evidence of intended function	Creates model that functions successfully according to specifications	Creates model that functions beyond expectations
Communication terminology	Uses little appropriate terminology for grade level	Uses some appropriate terminology for grade level	Uses most appropriate terminology for grade level	Uses all appropriate terminology for grade level
Communication clarity	Report lacks clarity	Communicates with some clarity	Communicates clearly, precisely (e.g., oral or written) through all stages of task	Communicates clearly, precisely, and insightfully

Communication presentation skills / style	Limited awareness of importance of style to suit purpose	Uses a presentation style that is somewhat appropriate to purpose and audience	Chooses a presentation style that is appropriate to purpose and audience	Skillfully chooses a presentation style that maximizes the impact for purpose and audience
Communication of basic concepts	Communicates understanding of few of the basic concepts	Communicates understanding of some of the basic concepts	Communicates understanding of most of the basic concepts (for grade level) e.g., oral or written	Communicates understanding of all of the basic concepts
Learning Log reflection for purpose	Makes limited reflection	Reflects on results but makes few changes	Reflects on results in order to make necessary changes and evaluate information gathered	Uses sophisticated reflection to record results. Makes changes and evaluates information gathered
Learning Log goals / time lines	Sets a few goals and describes few of the steps needed to achieve goals	Sets some goals and describes some of the steps needed to achieve goals	Sets clear goals and describes each step needed to achieve goals	Sets clear goals and describes each step needed to achieve goals and adjusts as necessary
Learning Log resources	Selects, records, and uses resources with limited appropriateness	Selects, records, and uses somewhat appropriate resources	Selects, records, and uses appropriate resources	Selects, records, and integrates appropriate resources
Group Work contribution to group goal	Has limited success working toward group goals	Demonstrates some commitment to the group goals; carries out specific roles with some success	Demonstrates commitment to the group goals and carries out assigned roles	Actively identifies group goals and fulfills a variety of roles in group

Sample Design Rubric

Categories↓	Needs Improvement 1	Fair (Novice) 2	Good 3	Excellent 4
Innovative Design (program and structure in unison)	Design is substandard; not able to achieve the challenge; motor movement is inaccurate; misuse of sensors	Design is standard with no surprises or innovation; achieves the challenge at least some of the time; standard use of sensors	Some unique features that make the design better than average; achieves the challenge all or almost all of the time; thoughtful use of sensors	The design is surprisingly unique, making it superior to others; achieves the challenge every time; superior use of sensors
Structure	Structure is fragile, falling apart under normal use	Structure often holds together under normal use, but is cumbersome or inefficient	Structure is strong and efficient; almost always holds together under normal use	Structure is both solid and elegant; holds up against mishandling
Program	Program unable to complete the challenge; not linked to sensors; illogical	Program often completes the challenge, but inconsistently, inaccurately, or taking more time than needed	Program is logical and efficient; achieves the challenge all or almost all of the time	Program is surprisingly sophisticated; achieves the challenge all of the time

Self-evaluation for SPICE Model

1. Were my sketches clear enough for others to understand?

1

2

3

4

5

2. Did I include written suggestions on my rough sketch?

1

2

3

4

5

3. Did my product do what I designed it to do?

1

2

3

4

5

4. If I worked with others, how well did I cooperate?

1

2

3

4

5

5. If I worked with others, how would I rate my contribution to the product?

1

2

3

4

5

(5= My best effort; 3 = Medium; 1 = Poor effort)

Accommodations and Modifications

Accommodations

- Allow access to the video provocations before and after lesson for developing background knowledge and review
- Have students work in groups or partners for research and design challenges
- Chunk the list of steps and include visuals to assist in completing the design challenges
- Allow students more time to complete the task
- Allow students to suggest another platform (to build on or to program with) or group of materials for completing the task to utilize students' prior knowledge
- Reduce the complexity of the challenge (i.e., reduce number of success criteria)

"Growing Success: Assessment, Evaluation, and Reporting in Ontario's Schools, First Edition Covering Grades 1-12", 2010) <http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf>

Modify an expectation for this activity based on student's IEP

- E.g., Grade 8 language expectation, Writing strand: (Students will) write complex texts of a variety of lengths, using a wide range of forms.
- Modified expectation: (The student will) write patterned short texts using specified forms.