

Developing 'Big Ideas' and 'Essential Questions' from a Learning Standard

Big Ideas help educators identify the major concepts that will be delivered through a lesson or in Introduction to STEM a design brief. It should be central to the discipline (in this class – science, technology, engineering, and mathematics), hold the potential to engage students, include commonly misunderstood materials, and be important enough for the students to remember when they are 30 years old. Look at the standards that you have identified for the project – what are those big ideas?

An Essential Question/s is an overarching or topical question/s that guide a unit, lesson, or design brief. I prefer to this of these as the question or questions that the student be able to answer after completing the lesson or design challenge? Remember to use **open-ended/open-response** types of questions.

Writing "big ideas" for a curriculum project helps articulate the overarching goals or themes that will guide student learning. These should focus on the enduring understandings or key concepts that students should retain long after they have completed the lessons. For example:

For the ELA standard 3.RC.7.RL: "Describe how characters respond to major events and challenges," here are some possible big ideas and essential questions to guide student understanding and instruction:

Big Ideas:

1. **Challenges Shape Character**
Characters grow and change based on how they respond to major events and challenges in a story.
2. **Responses Reflect Values and Beliefs**
The way a character responds to a challenge reveals their inner thoughts, values, and beliefs.
3. **Problem-Solving and Decision Making**
Characters' responses to events show how they solve problems and make decisions, which often impacts the outcome of the story.
4. **Emotions Drive Actions**
A character's emotions play a significant role in how they react to challenges, shaping their journey and the plot's direction.
5. **Growth Through Conflict**
Major events and challenges often provide opportunities for characters to grow, learn, and change.

Essential Questions:

- What can we learn about a character based on how they react to challenges?
- How do a character's decisions during major events affect the outcome of the story?
- How does a character's response to challenges reflect their personality and values?
- What role do emotions play in how characters respond to difficult situations?
- How do challenges help characters grow or change throughout a story?

Big Ideas and Essential Questions guide curriculum development including lessons, reading discussions, and activities focused on character analysis, helping students connect character development to major events in narratives.

Another example related to science would be 2-PS1-1 physical science standard: "Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties," here are some potential 'big ideas' and 'essential questions':

Big Ideas:

1. Materials Have Distinct Properties

Every material has unique observable properties (such as color, texture, hardness, flexibility) that help us identify and classify them.

2. Observations Lead to Discovery

Careful observation and investigation allow us to better understand the world around us and how materials behave.

3. Classification Helps Us Organize Information

Scientists group materials by their properties to better understand their uses and characteristics.

4. Properties Determine Use

The properties of materials influence how we use them in everyday life.

5. Scientific Inquiry Requires Planning

Planning and conducting investigations are key steps in the scientific process that help us answer questions and solve problems.

Essential Questions:

- What properties can we observe and use to classify different materials?
- How can we plan and conduct an investigation to learn about materials?
- Why is it important to classify materials based on their properties?
- How do the properties of a material help determine what we use it for?
- What tools and methods can we use to observe and describe materials accurately?

These big ideas and essentials questions help guide students as they plan and conduct an investigation, helping them understand the value of observation, classification, and scientific reasoning.

For the mathematics standard 4.GM.6: Identify and/or draw lines of symmetry for a two-dimensional figure" these would be some potential big ideas and essential questions to guide student understanding and instruction:

Big Ideas:

1. Symmetry exists in many shapes around us.

- Symmetry helps to understand balance, structure, and design in the natural and man-made world.

2. A line of symmetry divides a figure into two identical parts.

- When a figure is folded along its line of symmetry, both parts will overlap exactly.
- 3. **Different shapes can have different numbers of lines of symmetry.**
 - Some figures have multiple lines of symmetry, while others have none.
- 4. **Understanding symmetry helps in solving problems involving shape classification and design.**
 - Identifying symmetry is a key skill for analyzing geometric figures and can be applied in artistic, architectural, and engineering contexts.

Essential Questions:

1. What is symmetry, and how do we identify it in two-dimensional figures?
2. How can we use a line of symmetry to determine if a figure is symmetrical?
3. How does the number of lines of symmetry vary between different shapes?
4. How does understanding symmetry help us in the real world? Can you find examples of symmetry in nature or design?
5. What tools and strategies can be used to draw and verify lines of symmetry in two-dimensional figures?

These big ideas and essentials questions help guide students as they consider the use of symmetry in a design.