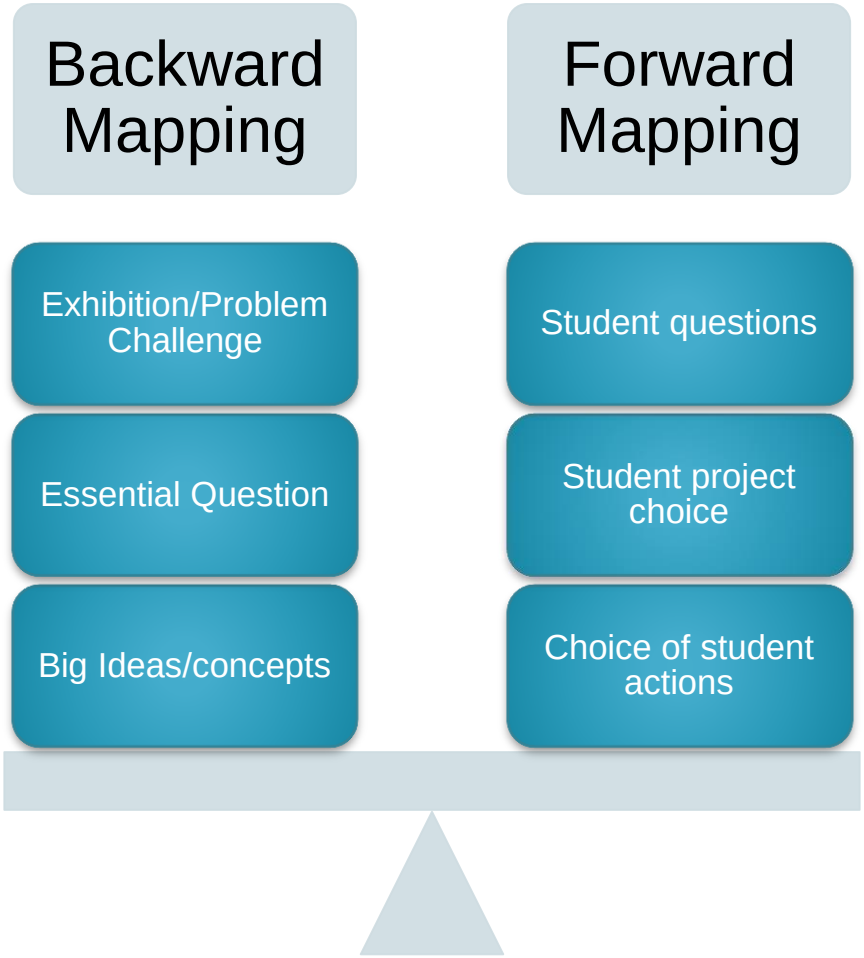
SEMIS Fall Professional Development Day 9/30/2016

HOW DO WE CONTEXTUALIZE OUR PLACE-BASED LEARNING ACTIVITIES WITHIN A LARGER INQUIRY?

Place-based education balances…



Backwards Mapping

Not always a linear process!!

Unit/Learning Plan

Lesson Plans

Activities/Events

Field Trips/Speakers

How will I teach them?

+

Assessment

Formative

Summative

Authentic

How will they show me they understand?

=

End Result

What do I want them to understand & be able to do?

Create concept maps of big ideas

Identify project and learning goals and culminating experiences

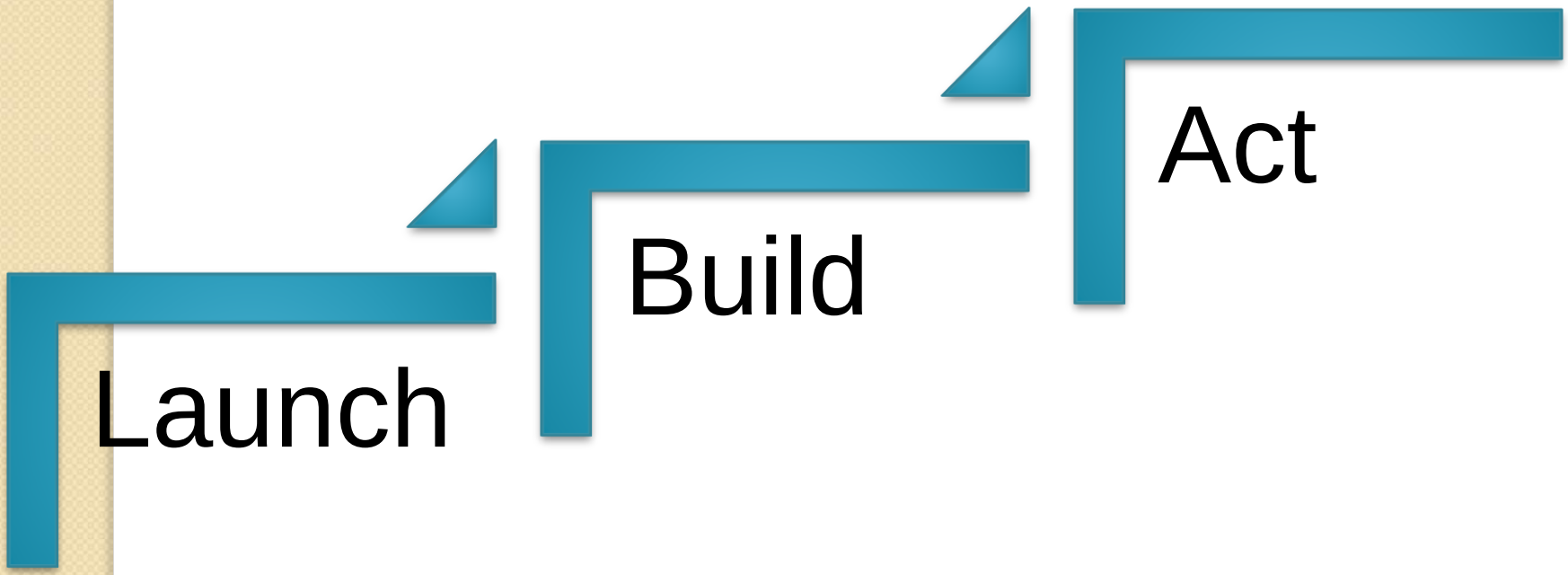
Identify standards

Connect to existing curriculum

Sketch a timeline/pacing

Step 3 ← Step 2 ← Step 1

Three stages of PBE curriculum



Levels of Inquiry

Inquiry is not all or nothing!

Using an Inquiry approach takes practice and scaffolding for students.

Amount of information provided

Figure 2 presents a modified version of the four-level model of inquiry we use to assess our instructional activities. The four-level model illustrates how inquiry-based activities can range from highly teacher directed to highly student centered, based on the amount of information provided to the student. The salient feature of this model is the question, "How much information is given to the student?"

Figure 2. Modified version of the four-level model of inquiry. How much information is given to the student?

Level of inquiry	Question?	Methods?	Solution?
1	x	x	x
2	x	x	
3	x		
4			

Using this framework as a guide, lab activities can be designed at varying levels of inquiry, depending on wording and presentation. This model allows the teacher to tailor inquiry lessons to the particular readiness levels of the class. For instance, a Level 1 activity can become a Level 2 by having students complete it prior to learning the targeted concept, and a Level 2 activity can be revised easily to Level 3 simply by removing the procedural directions.

Levels of Inquiry

Figure 3. Levels of inquiry in an effervescent antacid tablet activity. Reprinted with permission from Rezba, Auldridge, and Rhea (1999).

Inquiry level	Description and examples
1	**Confirmation**—Students confirm a principle through an activity in which the *results are known in advance.* "In this investigation you will confirm that the rate of a chemical reaction increases as the temperature of the reacting materials increases. You will use effervescent antacid tablets to verify this principle. Using the following procedure, record the results as indicated, and answer the questions at the end of the activity."
2	**Structured inquiry**—Students investigate a teacher-presented question through *a prescribed procedure*. "In this investigation you will determine the relationship between temperature and the reaction rate of effervescent antacid tablets and water. You will use effervescent antacid tablets and water of varying temperatures. Using the following procedure, record the results as indicated, and answer the questions at the end of the activity."
3	**Guided inquiry**—Students investigate a teacher-presented question using *student designed/selected procedures*. "Design an investigation to answer the question: What effect will water temperature have on the rate at which an effervescent antacid tablet will react? Develop each component of the investigation including a hypothesis, procedures, data analysis, and conclusions. Implement your procedure only *when it has been approved by your teacher*."
4	**Open inquiry**—Students investigate topic-related questions that are *student formulated* through *student designed/selected procedures*. "Design an investigation to explore and research a chemistry topic related to the concepts we have been studying during the current unit on chemical reactions. Implement your procedure only *when it has been approved by your teacher*."

Inquiry woven into standards

BOX S-1

THE THREE DIMENSIONS OF THE FRAMEWORK

1 Scientific and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

2 Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change

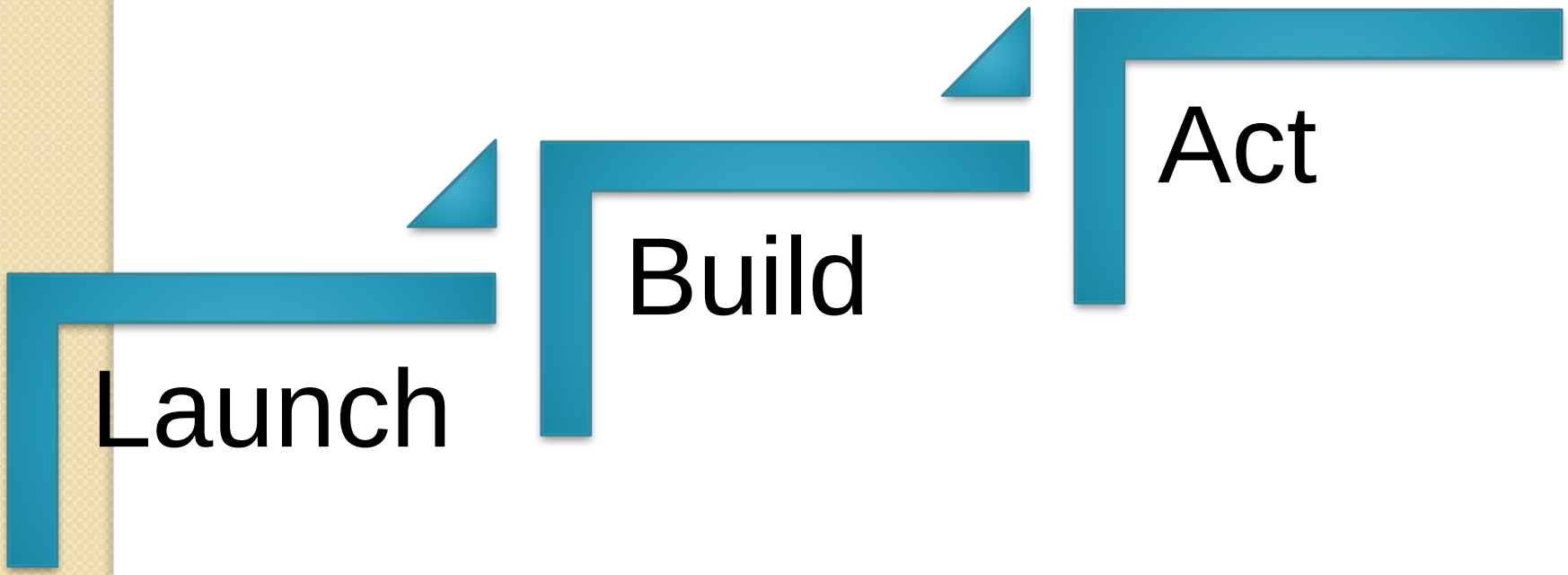
3 Disciplinary Core Ideas

Physical Sciences

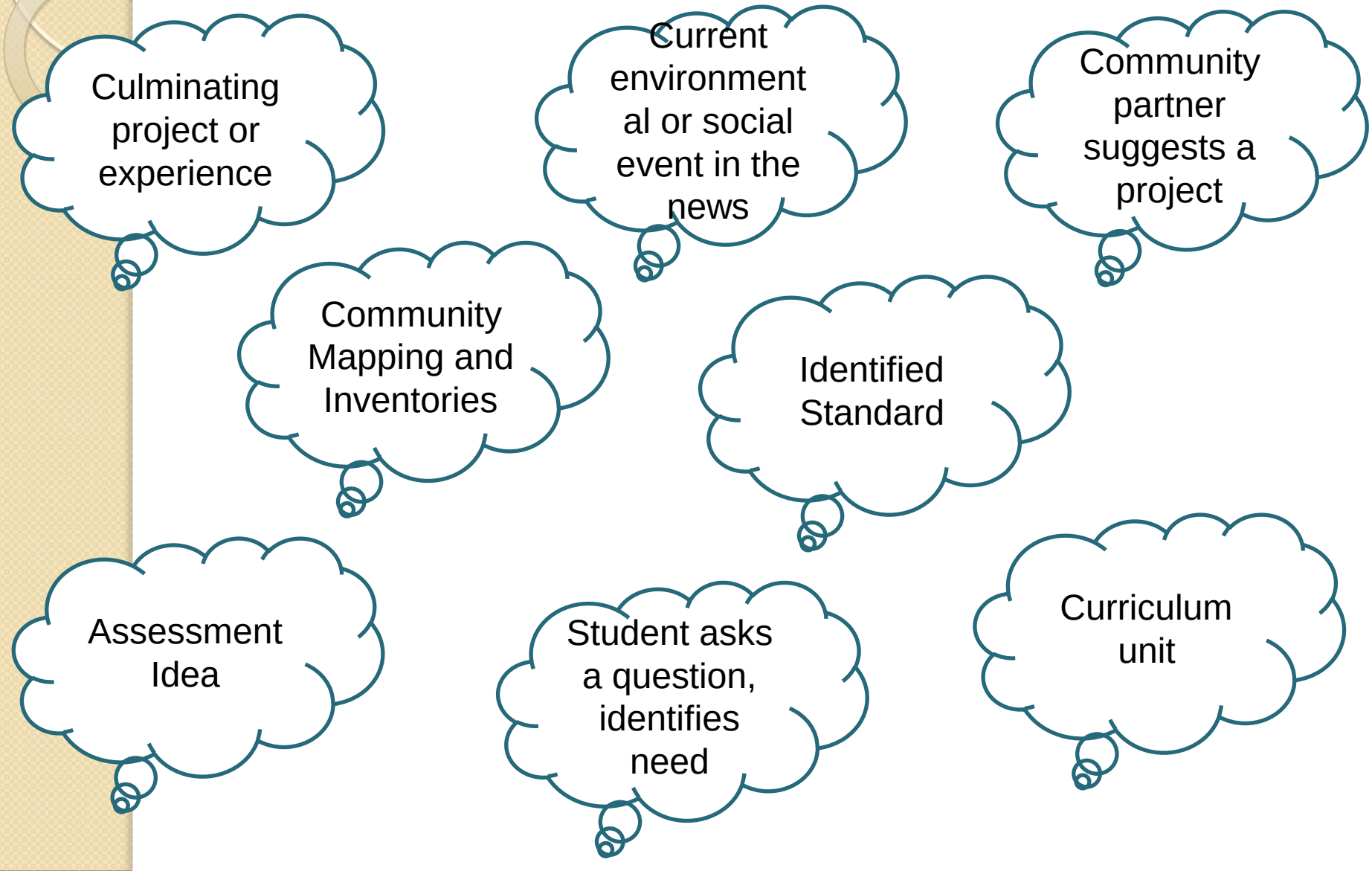
PS1: Matter and its interactions
PS2: Motion and stability: Forces and interactions
PS3: Energy
PS4: Waves and their applications in technologies for information transfer

THE INQUIRY ARC OF THE C3 FRAMEWORK

Three stages of PBE curriculum



Entry points for PBE planning



Examples of Entry Points:

Entry Point	Example
Culminating project or experience	• MI Sea Grant boat experience, • Bioswale • Outdoor learning space
Identified Standard	Neinas Elementary – Scientific Method/ UofM Dearborn partnership
Community partner suggests a project	Friends of the Rouge – River Education Project
Assessment Idea	Mural Project
Student asks a question, identifies need	Abandoned lots near schools
Curriculum Unit	Rudolf Steiner
Current environmental or social event in the news	Flint Water Crisis Ann Arbor Dioxane Plume Detroit Flooding
Community Mapping & Inventories	Neinas neighborhood walks