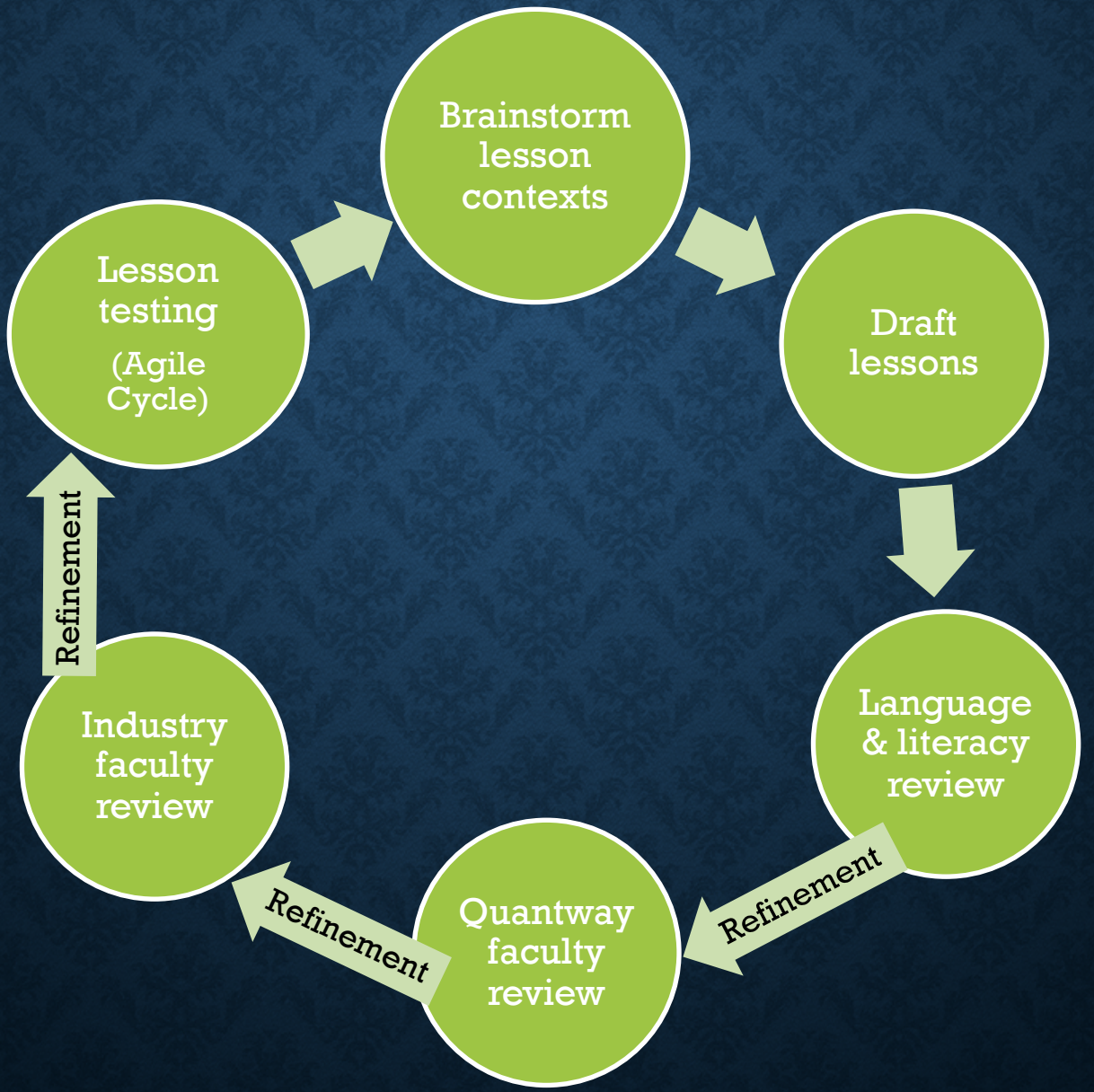
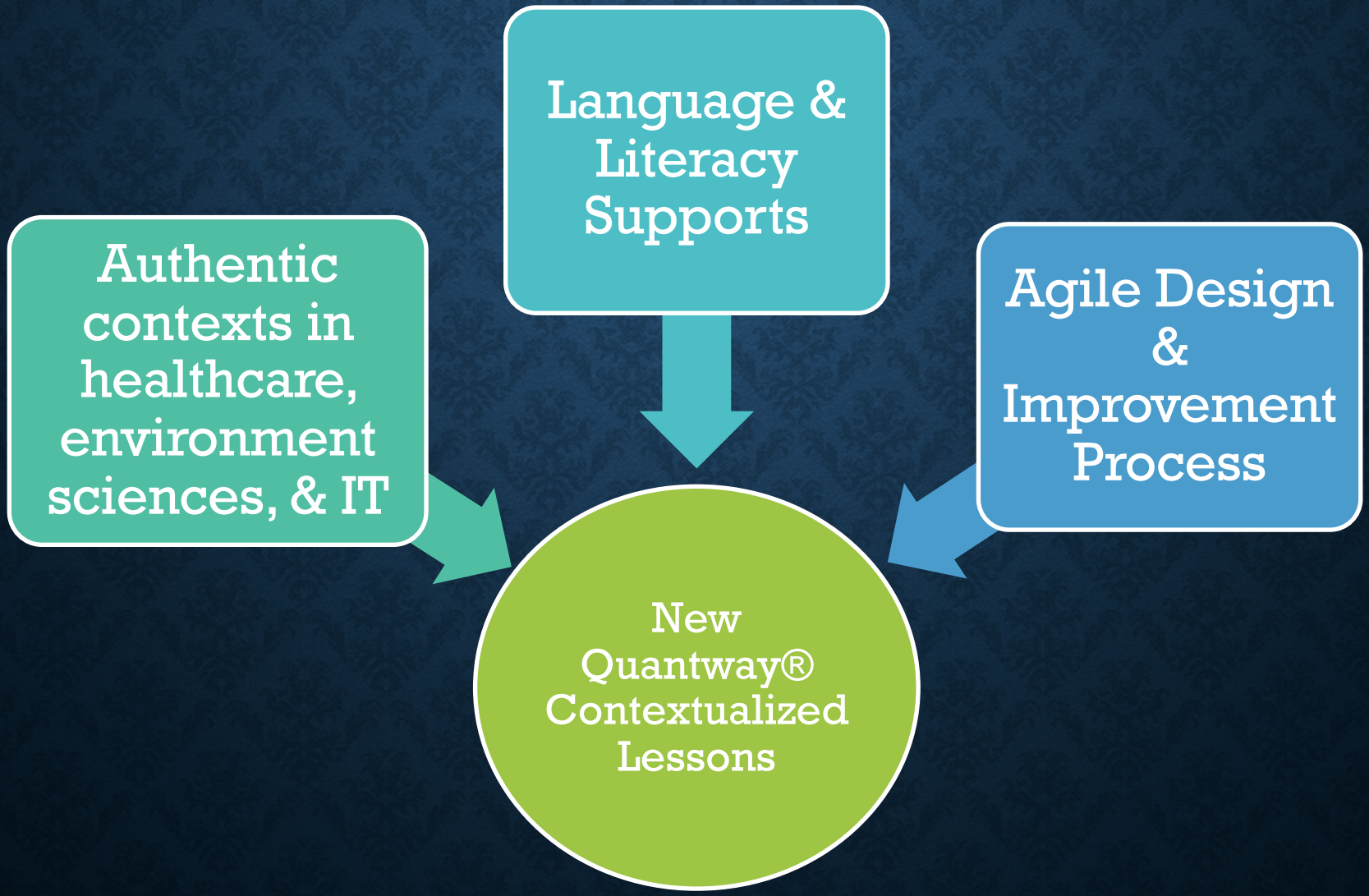
SESSION 6: THE CONTEXTUALIZATION PROCESS: AN OVERVIEW

June 1, 2017
Madison, WI

COLLABORATIVE DESIGN PROCESS (IDEALIZED)

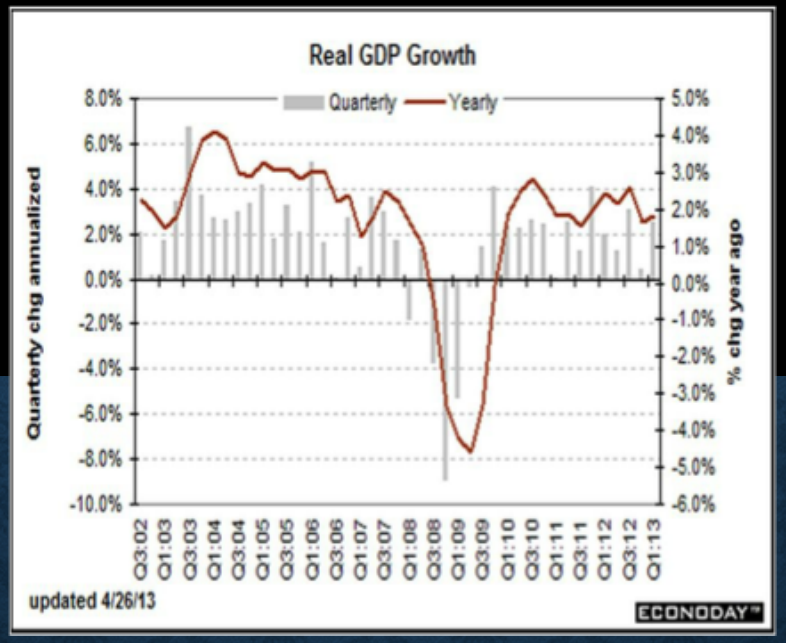


DESIGN ELEMENTS OF QUANTWAY CONTEXTUALIZED LESSONS

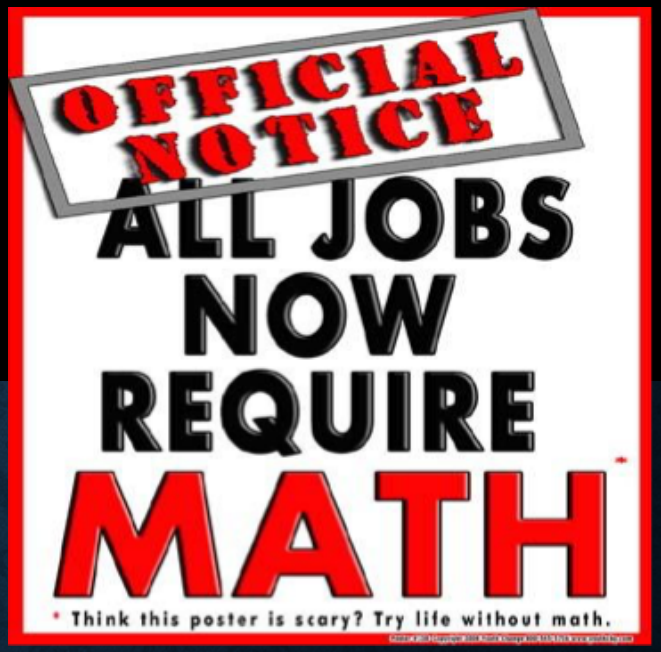


Primary Design Principle: Contextualization

Introduce students to industry topics



Compelling, authentic, and relevant problem situations



Convey that mathematics really matter!

Testing the Prototype

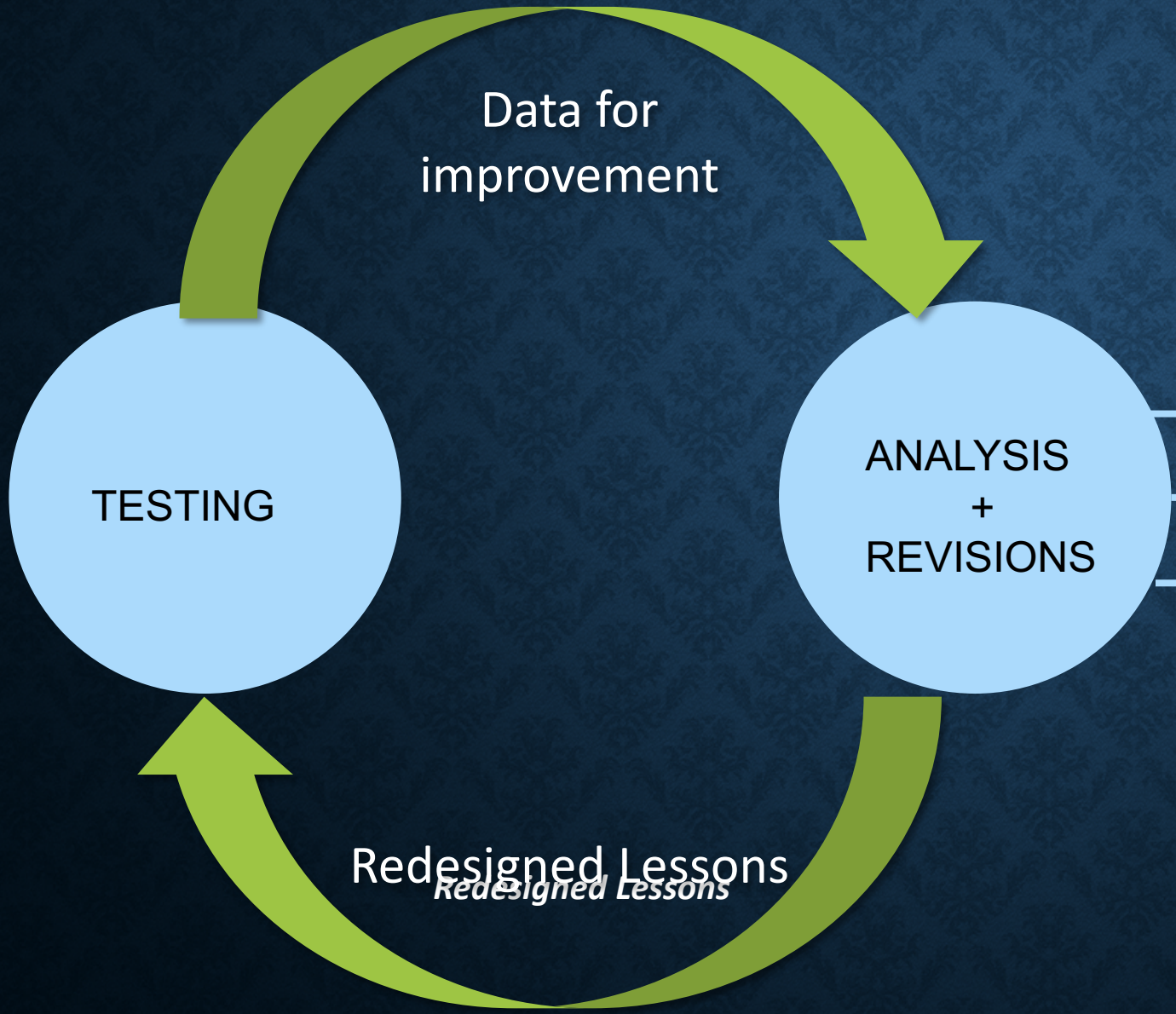
- What does the prototype actually look like in the classroom? Is the prototype useable? How can it be improved?
- Does the testing process work? How can it be improved?

AGILE PROCESS GOALS

Testing and Improving Lessons:

- Main and supportive quantitative context
- Appropriateness of mathematical objectives
- Balance between context and mathematics
- Homework
- Instructor's Notes (method of instruction, facilitation prompts, alternative scenarios, etc.)
- Timing
- Language and literacy tools

Lesson Testing Process



- **2 instructors**
- **3 cycles of testing**

Immediate Revisions
(Overnight)

Medium Level Revisions
(midway through testing)

Long-term Revisions
(following testing)

Data Collected During Lesson Testing

- Student focus groups
- On-site and videotaped observations
- Instructor interviews
- Instructor surveys
- Student surveys
- Student work

DATA SOURCES

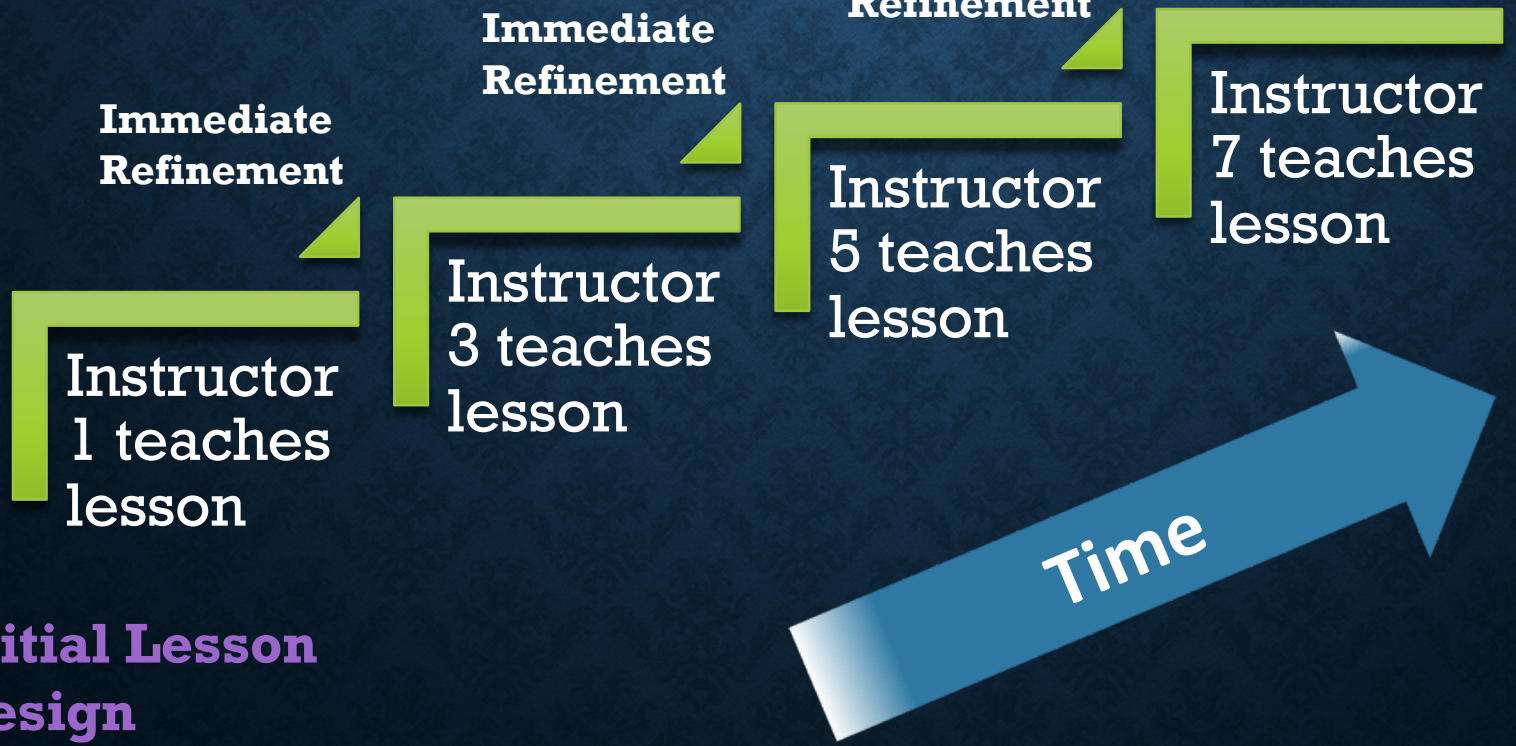
- Student surveys
- Instructor surveys
- Instructor interviews
- Focus group interviews with students
- Analysis of student in- and out- of class work
- Videotaped lesson observations

AGILE PROCESS (IDEALIZED)

Results in stable and usable lesson

Medium Level Refinements

<u>Long-term revisions</u> (months later), formalize for broad-based implementation



Initial Lesson Design

Examples of changes to the lessons during the lesson testing phase

EXAMPLE 1: LESSON 1.4 AFFORDABLE CARE ACT

ANTICIPATING THAT STUDENTS WILL STRUGGLE WITH PERCENTAGES HIGHER THAN 100

Note: Students will likely struggle with using a percent that is greater than 100%. This may be a good place to talk about the PNL, where students worked on a problem with a percentage than 100. Point out that 150% can be expressed as 100% plus 50% of the poverty line, or 50% plus 50% plus 50%. The goal is for students to realize that 150% is 1.5 times the poverty line. If students are struggling, ask students what $11, 670 represents as a percentage. Make sure they realize that $11,670 represents 100%.

EXAMPLE 2: LESSON 2.3 RENEWABLE ENERGY

ADDING IN AN ADDITIONAL EXAMPLE FOR INSTRUCTORS TO DO WITH STUDENTS

Note: You may want to discuss the common mistakes students make with absolute and relative change. The most common mistake with absolute change is not using units, and the most common change with relative change is using the wrong reference value. Typically, students struggle most with relative change. You may want to do a mini-lesson using real-world numbers, such as rent, before moving onto question 3.

Relative change is often a challenging concept for students to understand. Depending on your class, you may want to provide an outside example to introduce relative and absolute change with your students. Here is one possible example you could use with your class.

	Weight 2013	Weight 2015
Cat	12 lbs	16 lbs
Elephant	11,000 lbs	11,007 lbs

EXAMPLE 3: LESSON 3.1 ACETAMINOPHEN OVERDOSES

ADDING MORE LAYERS TO THE PROBLEM FOR ADDITIONAL STUDENT PRACTICE

(7) As parents to an infant, Andy and Amanda must consider what to feed Isabela. For newborns, there are two different types of formula: a 'Ready-to-Feed' liquid, and a powder formula. Formula is very expensive. Andy and Amanda must calculate the cost for each formula to determine which one fits their budget. They must feed little Isabela every 3 hours, and each feeding is 140 mL. Remember, 1 ounce= 30 mL.

(a) The 'Ready-to-Feed' liquid costs $8 for 32 ounces of formula. What is the cost of using the 'Ready-to-Feed' formula for 1 month?

(b) The powdered formula is $32 for 1 container of powder. This makes 169 ounces of formula when mixed with water. What is the cost of using the powdered formula?

Note: As a class, discuss which formula would be cheaper for Andy and Amanda. Ready-to-feed formula is more convenient to use but it is $68 more expensive (or 32% more) each month than the powdered formula.

Contextualizing QW lesson to develop discipline-specific mathematics lesson

EXAMPLE FROM CULINARY ARTS

- Removed the context and replaced it with discipline-specific content relevant to students' field of study
- Swapped the problem situations with real-world challenges frequently faced in the discipline
- Designed the lessons to reinforce the language, operations, and non-math skills specific to the discipline

Lesson Structure: Design Features for Instructors

What do we keep?	What do we add?	What do we tweak?
Learning goals Timeline Problem situations (word problems)	Steps to answers in teacher's edition	Homework Assigned homework from culinary textbook

Lesson Structure: Design Features for Students

What do we keep?

- Problem situations (word problems)
- Group work

What do we add?

- "Do now"
- Kitchen lab
- Integrated disciplinary concepts & questions

What do we tweak?

- Further applications
  - At least two questions: one discipline-specific and one mathematical