

Building Lessons for All Students

Gallery Workshop for Grades 9 – 12

NCTM Annual Meeting and Exhibition
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Our Motivation

Why did we become teachers?

What is the best way to teach?

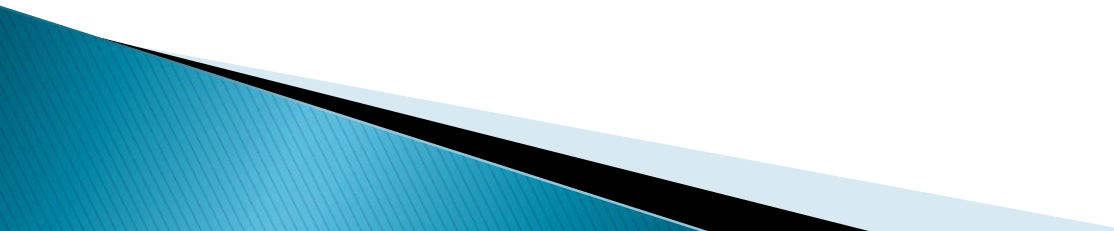
What is the best way to learn?

Is there only one way?



Lessons Evolve

We start with a basic lesson or activity and then add/revise as we find new ideas, reflect on what worked and what did not, and try to find ways to better connect with our students and their knowledge.



What Does it Mean to Teach ALL Students?

Have high expectations for all

Provide worthwhile opportunities
for all

Accommodate differences

Support needs



Studying the Curriculum

1. What should students know and be able to do?
2. How does learning develop throughout the instructional sequence?
3. What prior knowledge is needed to understand the concepts?
4. How does this content relate or lead to future understandings?

How do we work collaboratively?

Studying the Curriculum

1. What are the different pathways students might take to develop understanding of this content?
2. How will we support those students who struggle?
3. How has our understanding of the content for this instructional sequence changed?
4. What are the implications for instruction and assessment?

**Before criticizing someone,
walk a mile in their shoes . . .**

**that way, if they get upset,
they will be a mile away and
barefoot.**



When you improve a little each day, eventually big things occur . . . Not tomorrow, not the next day, but eventually a big gain is made. Don't look for the big, quick improvement. Seek the small improvement one day at a time. That's the only way it happens - and when it happens, it lasts.

- John Wooden

**“Learning” is more
important than
“teaching”**

Where are your students?

How do you know?

Checkpoint 1

What is differentiation?

**How well do you understand
differentiation?**

1 2 3 4

Find a partner.

Discuss your understanding and share
some examples of differentiation.

Differentiated Lessons

Think about learning profiles and/or
interests

What's the task?

**How can I modify the task to incorporate
specific learning profiles?**

**How can I modify the task to incorporate
specific interests?**



Lesson Design

Objective of the Lesson/
The Big Picture

Mastery Objective

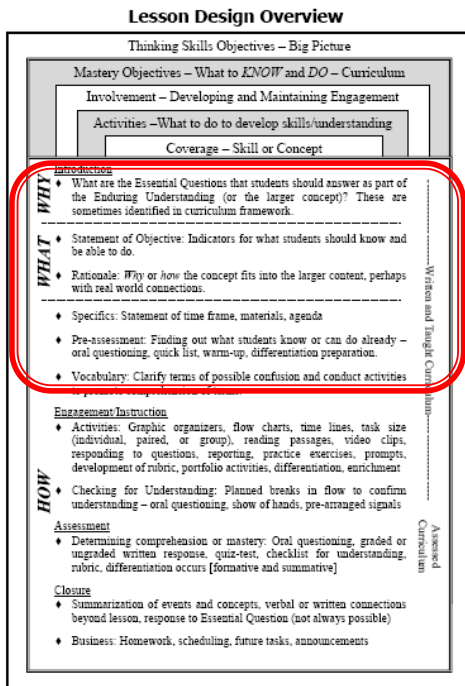
Involvement/
Developing Engagement

Lesson/Activities

Did the Students Get It?

Lesson Design Overview	
Thinking Skills Objectives – Big Picture	
Mastery Objectives – What to <i>KNOW</i> and <i>DO</i> – Curriculum	
Involvement – Developing and Maintaining Engagement	
Activities – What to do to develop skills/understanding	
Coverage – Skill or Concept	
WHY	<u>Introduction</u> <ul style="list-style-type: none">What are the Essential Questions that students should answer as part of the Enduring Understanding (or the larger concept)? These are sometimes identified in curriculum framework.
	<u>WHAT</u> <ul style="list-style-type: none">Statement of Objective: Indicators for what students should know and be able to do.Rationale: <i>Why</i> or <i>how</i> the concept fits into the larger content, perhaps with real world connections.<ul style="list-style-type: none">Specifics: Statement of time frame, materials, agendaPre-assessment: Finding out what students know or can do already – oral questioning, quick list, warm-up, differentiation preparation.Vocabulary: Clarify terms of possible confusion and conduct activities to promote comprehension of terms.
HOW	<u>Engagement/ Instruction</u> <ul style="list-style-type: none">Activities: Graphic organizers, flow charts, time lines, task size (individual, paired, or group), reading passages, video clips, responding to questions, reporting, practice exercises, prompts, development of rubric, portfolio activities, differentiation, enrichmentChecking for Understanding: Planned breaks in flow to confirm understanding – oral questioning, show of hands, pre-arranged signals
	<u>Assessment</u> <ul style="list-style-type: none">Determining comprehension or mastery: Oral questioning, graded or ungraded written response, quiz-test, checklist for understanding, rubric, differentiation occurs [formative and summative]
	<u>Closure</u> <ul style="list-style-type: none">Summarization of events and concepts, verbal or written connections beyond lesson, response to Essential Question (not always possible)Business: Homework, scheduling, future tasks, announcements

Lesson Design



Objective of the Lesson/ The Big Picture

What questions should students be able to answer at the end of the lesson?

What is the Big Picture
(larger concept)?

These are often identified in
the curriculum

Lesson Sample: Understanding Patterns

Thinking Question:

What is the “Big Picture” when we talk about representing and continuing patterns?



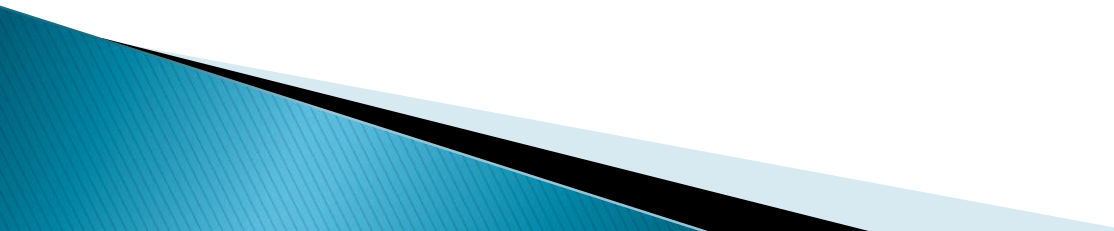
Lesson Design

Mastery Objective

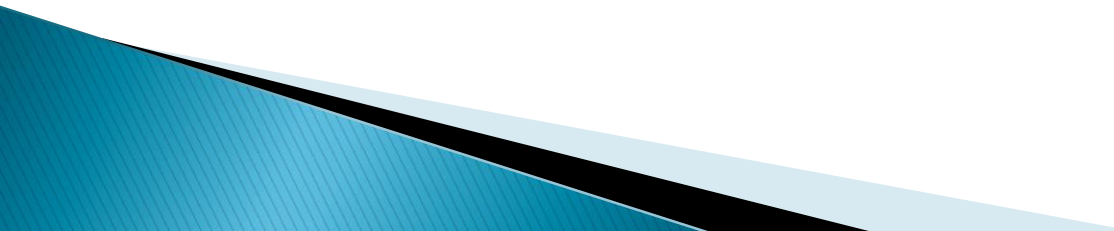
State the Objective – What should students know and be able to do?

The “**Why**” or “**How**” of the concept and placed in both a Real World and “**Big Picture**” context

Lesson Sample: Understanding Patterns

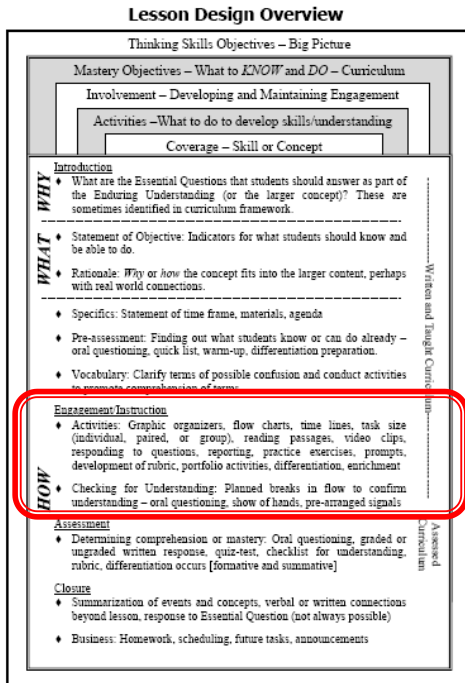
- ▶ What should students know and be able to do in representing, continuing, and generalizing patterns?
 - ▶ What questions do we want students to be able to answer involving patterns?
- 

Lesson Sample: Understanding Pattern

- ▶ When do students first learn about patterns?
 - ▶ What is the usual context for their understanding?
- 

Lesson Design

Involvement/Developing Engagement



Specifics: timing, materials, agenda

Pre-assessment

Vocabulary

Activities to promote comprehension

Discourse

Student engagement

Lesson Design

Lesson/Activities

Activities: Graphic organizer, individual task, paired work, or group activity, reading passages, responding to questions, practice exercises, activities

“Checking for Understanding”: Planned breaks in flow to confirm understanding: questioning/pre-arranged signals

Lesson Design

Lesson/Activities Continued

Importance of student movement
and interaction

Student choice within activities, projects, and
homework

Anchor Activities – ongoing activities that
students work on independently

Lesson Sample: Understanding Patterns

- ▶ What activities will help students meet our objectives?
 - **Building with Toothpicks**
 - **Sequence of Tiles**

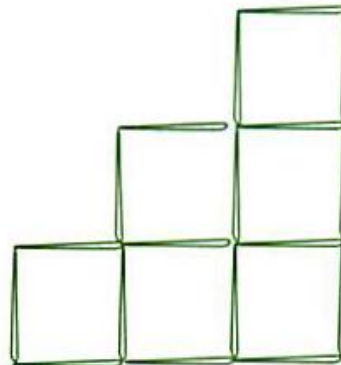
Building with Toothpicks



Shape 1



Shape 2



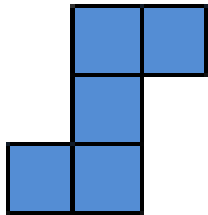
Shape 3



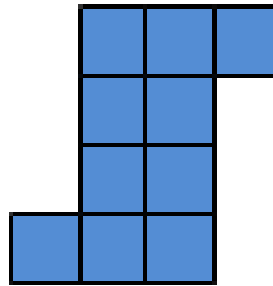
Shape 4

Friel, S., Rachlin, S., Doyle, D., Nygard, C., Pugalee, D., & Ellis, M. (2001). *Navigating through Algebra in grades 6-8*. Reston, VA: NCTM.

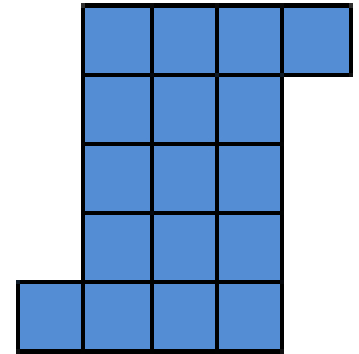
Sequence of Tiles



Shape 1



Shape 2

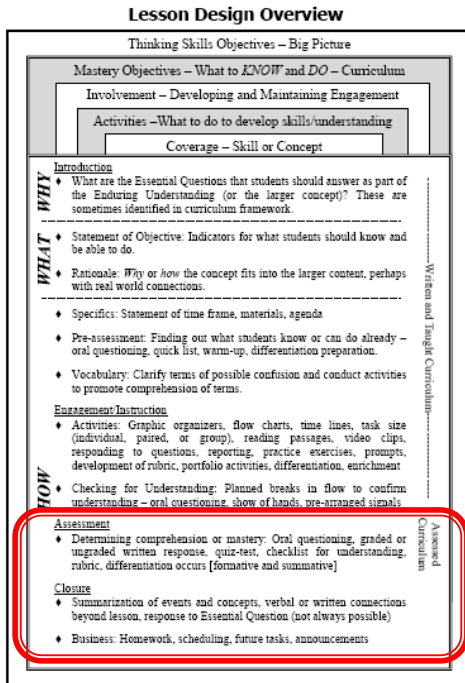


Shape 3

Friel, S. N., & Markworth, K. A. (2009). A framework for analyzing geometric pattern tasks. *Mathematics Teaching in the Middle School*, 15(1), 24-33.

Lesson Design

Did the Students Get It?



Determining comprehension or mastery: questioning or exit card or quiz or test

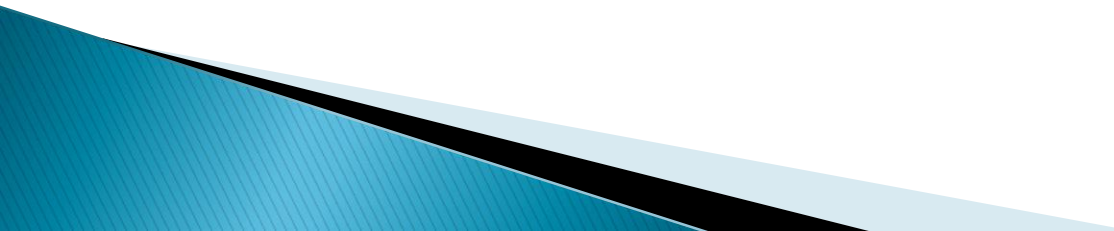
Formative and Summative

Summary of the lesson

Response to initial question of the lesson

Checkpoint 2

How do we know if students are learning?

- What evidence can we collect?
 - How do we interpret the evidence?
 - What do we do with the evidence?
 - What should students be doing?
- 

Using Ongoing Assessment

Pre-assessment

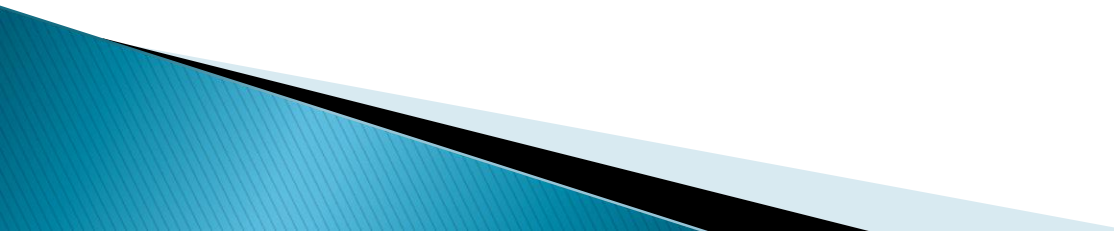
Assessment during instruction

Post-assessment



Lesson Sample: Understanding Patterns

How does the type of questions we ask during the lesson help us learn if students have learned the objective?



Questioning

There are many ways to organize types of questions:

- ▶ Levels of intellectual behavior (recall, describe, apply, formulate, judge) [Bloom]
- ▶ Types of student activity (engage, refocus, clarify) [Bright and Joyner]
- ▶ Algebraic Habits of Mind (doing–undoing, building rules, abstracting) [Driscoll]
- ▶ Managing, clarifying, orienting, prompting mathematical reflection, eliciting algebraic thinking [Driscoll]

**Mathematics should be about reasoning,
not procedures**

Questions I Seldom Ask, by David R. Johnson

How many of you understand that?

Everybody see that?

You want me to go over that again?

Did I go too fast for you?

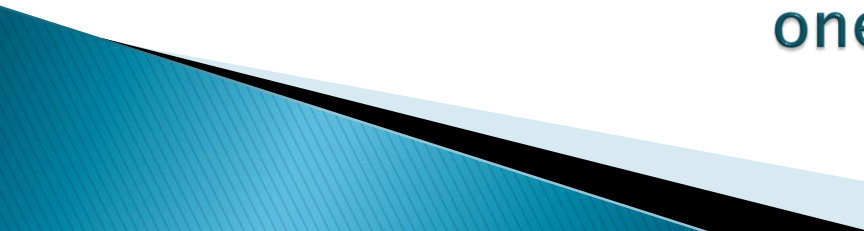
This is a right triangle, isn't it?

Right?

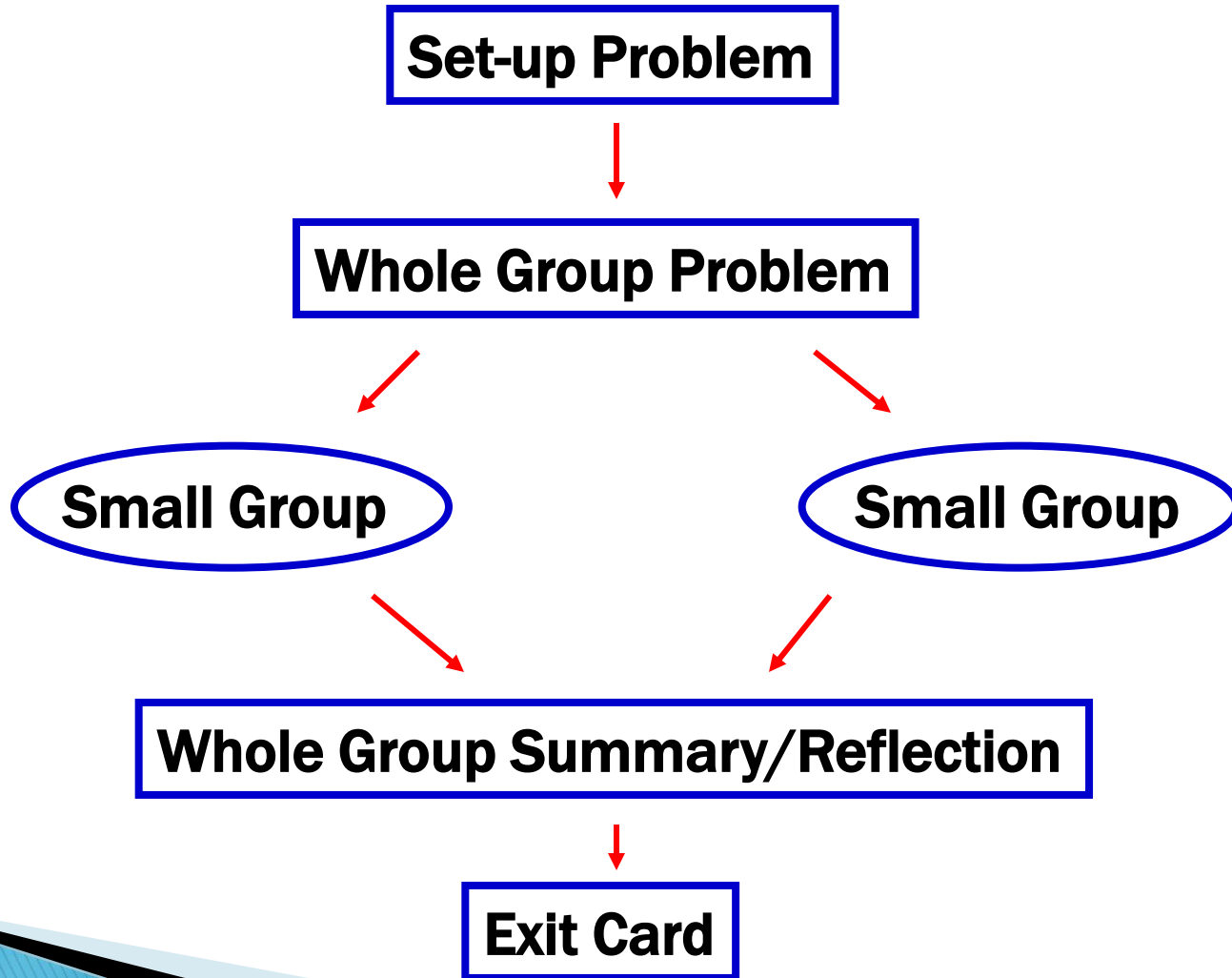
Do you have any questions?



Broad strategies for using assessment to support learning

- Clarifying and sharing learning intentions and criteria for success
 - Engineering effective classroom discussions, questions, and learning tasks
 - Providing feedback that moves learners forward
 - Activating students as owners of their own learning
 - Activating students as instructional resources for one another
- 

One Possible Lesson Design



Climate for High Achievement for All Students

Building Relationships

Group and Cooperative Learning

Confidence and Risk Taking

Learning from Mistakes

Care and Perseverance

Quick and Detailed Feedback

Effort and Effective Strategies

Empowering Students



**The old adage is true, you
can lead a horse to water,
but you can't make him
drink.**

**However, it is the teacher's
job to make him thirsty.**

Glenda Lappan



Checkpoint 3

So what is important in lesson design?

REFLECTION

Communicate clear, specific expectations.

Be direct.

Model enthusiasm.

Be positive.



REFLECTION

Move among the students.

Have high expectations.

Respect your students.

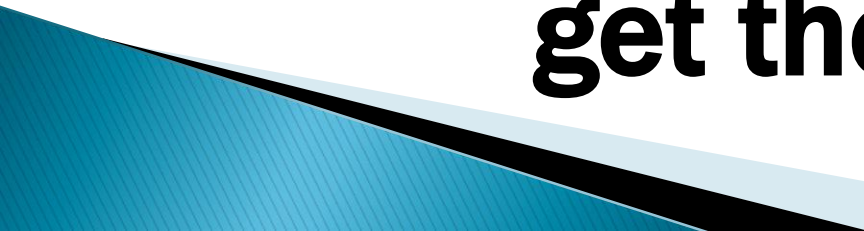
Encourage persistence.

Use humor.



**Remember, the Romans did not
build a world empire by just
talking . . .**

**OK, they did it by killing all who
opposed them, but you
get the idea. 😊**



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Presentation materials available at:
nolanmath.com/Building3.htm