

# When and Why to Use Small Groups

**Karen C. Fuson**

Northwestern University  
Professor Emerita

My website is [karenfusonmath.com](http://karenfusonmath.com)  
or [karenfusonmath.net](http://karenfusonmath.net)

*Author of Math Expressions*  
a PK to Grade 6 math program

**The heart of *Math Expressions* is a  
nurturing  
meaning-making  
visual  
Math Talk Community.**

# A nurturing meaning-making visual Math Talk Community

is an inquiry-based teaching/learning environment, and has a continual focus on sense-making by all participants.

Students are expected:

- to understand what they are doing,
- come to be able to explain their thinking,
- understand the thinking of other students,
- learn to seek help when they need it, and
- help others who need it.

## How to create a Nurturing Sense-Making Math Talk Community

The teacher orchestrates collaborative instructional conversations focused on the mathematical thinking of students, using these responsive means of assistance that facilitate learning and teaching by all:

- Engaging and involving
- Managing
- Coaching which is modeling, clarifying, instructing/explaining, questioning, feedback.

# How Do Teachers Support Sense-Making in the Math Talk Community?

**By reading the TE** and using and assisting students to use and relate what is in the lessons:

Mathematical real-world situations

Pedagogical supports especially math drawings

Cultural mathematical symbols and words

**and eliciting and discussing  
student's own explanations of their  
thinking about all of these**

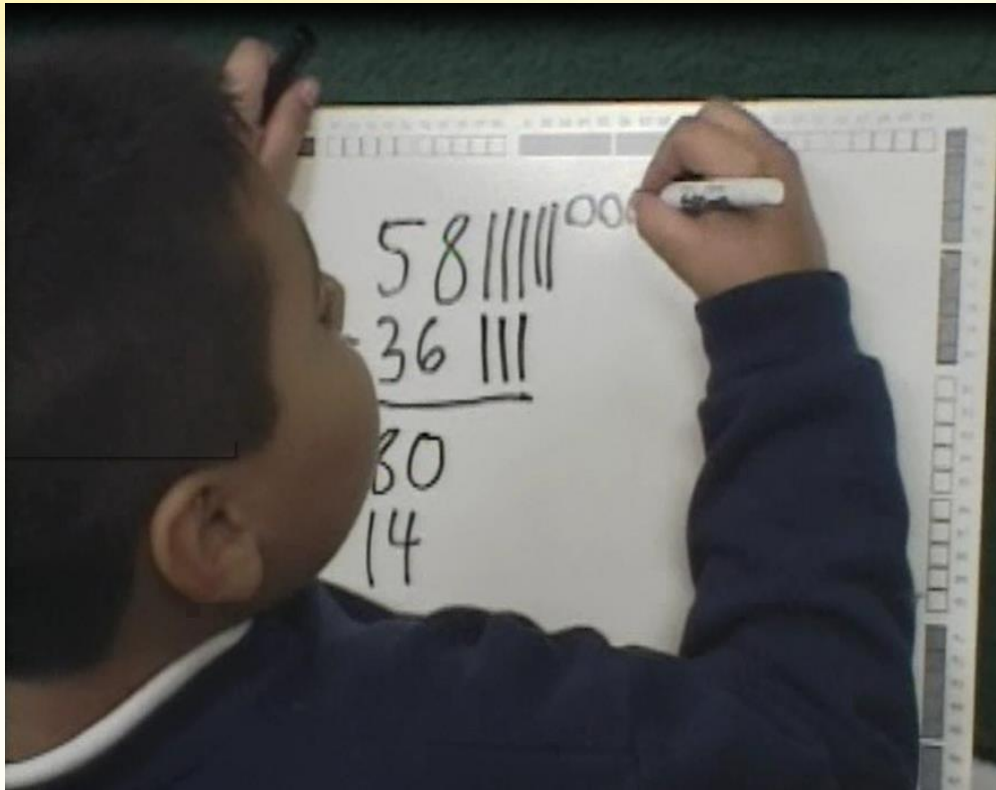
## Solve and Discuss Classroom Structure

<b>Solve</b>	<b>Explain</b>	<b>Question</b>	<b>Justify</b>
<p><b>All students solve.</b> Some solve at the board, and the rest at their seats.</p>	<p><b>One student at the board</b> explains and then asks, “Are there any questions?”</p>	<p><b>Other students</b> ask questions to clarify or extend.</p>	<p>The original explainer <b>responds to the questions</b> by explaining more (justifying the original explanation).</p>

Any student at any time can ask for help from anyone.

For more practice, Solve and Discuss can take place in pairs or small groups.

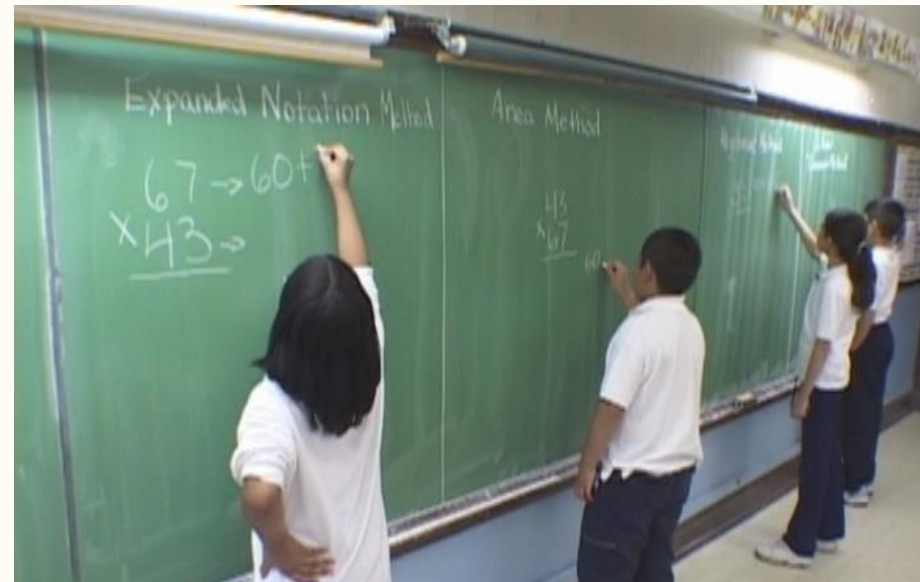
# Make the math thinking visible



- Students must make some kind of math drawing related to the math symbols to show their thinking.
- This supports understanding by the listeners and promotes meaning.

# Make the math thinking visible

- This is important for **equity**: less advanced students and English Learners are helped by the math drawing linked to the explanation by pointing.
- Be sure that **important methods remain** on the board or can be made visible again (e.g., on a Math Board) so they can be compared with other methods.







2. “Bite your tongue” to provide wait time. Students will explain, ask questions, or add a comment if you wait.

## Students must speak and not just listen

1. Structure opportunities to explain to a partner and repeat what the partner says, if needed. Students eventually find their own words, but may need the security of saying an explanation they know is correct.
3. Help students speak to classmates by moving to the side or back of the room. Later remind students with a silent gesture to address each other.

A nurturing meaning-making visual  
Math Talk Community  
is what students and teachers need  
to recover from the deprivations  
of the covid years.

It is therapy for the soul and the self.  
Everyone needs to belong to a community in  
which your thinking and your self is valued and  
in which you can help others.

## So why use small groups?

To make several mini nurturing meaning-making  
visual Math Talk Communities  
so that all students get turns  
**explaining their thinking,**  
**listening** to another student explain,  
and **helping** other students.

## When to use **helping small groups** for Math Talk?

When enough of your students have a method they are confident in explaining and can become the student leaders in their **helping small group**.

**Each helping small group needs at least one student leader with an accurate method.**

Also make groups that can work together. The groups can be of different sizes if that can help them work better.

## Solve and Discuss Classroom Structure for helping small groups

Solve	Explain	Question	Justify
All students solve the same problem in their small group.	One student explains and then asks, “Are there any questions?”	Other students ask questions to clarify or extend.	The original explainer responds to the questions by explaining more

**Explain, question, and justify is repeated for each group member.  
Everyone helps as needed.**

**Clarify for students that the goal for helping small groups is for everyone in the group to explain a method.**

**These methods can be the same or different.**

**All students need to be able to explain because randomly chosen students will go to the board to explain a method to the whole class.**

**The explaining student can get help from their group if needed.**

If there are many groups, half explain the first problem and half explain the next problem.

Student work in the small group has to be able to be shared with the whole class in such a way that time is not wasted by the math drawing and written method needing to be done again.

**So students need to work on MathBoards or paper that can be projected to the whole class.**

Paper can be picked up to be checked at the end of class to monitor student work if needed.

## **A possible culminating activity**

When many students are getting good at solving and explaining a given type of problem, several related problems can be given.

Each group solves a different problem on chart paper.

The chart paper is posted around the room.

Groups rotate to each chart paper and discuss and edit and add comments.

Solutions can differ across groups, and a group could decide to show more than one method.

Thanks to Robyn Decker for this idea.



## How Do Teachers Support Students to Work Together in Small Groups?

**By assisting students to use** the responsive means of assistance you have been using to facilitate learning and teaching in whole-class sessions:

- Engaging and involving
- Managing
- Coaching which is modeling, clarifying, instructing/explaining, questioning, feedback

**So in the whole group teaching emphasize when you use these means and also assist students to use them.**

## How Do Teachers Support Students to Work Together in Small Groups?

These means of assistance can initially be summarized as social norms for the whole class and small group sessions:

**We do these three things in our math class:**

- 1. Listen carefully.**
- 2. Be ready to help.**
- 3. Ask for help if we need help.**

These can be written and posted in the classroom and can be summarized as **Everyone is a teacher and a learner.**

# How Do Teachers Support Students to Work Together in Small Groups?

As you watch a small group you need to

- 1. Listen carefully.** Bite your tongue. WAIT AND ASSESS.
2. Support students to assist each other. Ask questions about what might help:
  - Has everyone had a turn yet?
  - Did you ask who needs help?
  - Did you ask classmates to ask questions?
  - Did you ask someone to explain what you said in their own words?

## Support students to relate steps in math drawings to steps in written methods.

These relationships are the source of meanings.  
They may need special attention and help.

- Show us that written step in your drawing.
- How did your drawing tell you what to write in your written method?
- Do you have a question about any steps in the method \_\_\_\_\_ just did?
- Can you explain that step in your own words?

## What if several small groups are stuck?

Have students get up and walk around the room looking at what other groups have done so far. Walking and seeing other work can stimulate ideas.

Each small group and the whole class is a **helping community**. Looking at the work of other people is not 'cheating' if that work can help another student move further in a solution they can explain.

## Building a Math Talk Community

These questions are in the TE right before Lesson 1 except in Grades 3 and 6 where they are later. The third section is different from the version in the TE and is important to stress when you are teaching. This handout is posted below this video on Shannon's website.

### **Elicit student thinking**

So, what is this problem about?

Tell us what you see.

Tell us your thinking.

### **Support student thinking**

Tell us more about \_\_\_\_.

What were you thinking when you decided to \_\_\_\_?

Use wait time: Take your time. We'll wait.

### **Support students to relate steps in math drawings to steps in written methods**

Show us that written step in your drawing.

How did your drawing tell you what to write in your written method?

Do you have a question about any steps in the method \_\_\_\_ just did?

Can you explain the \_\_\_\_ step in your own words?

### **Extend student thinking**

Restate: So you're saying that \_\_\_\_\_?

Is that true for all cases?

How is your way of solving like \_\_\_\_\_'s way?

How is your way of solving different from \_\_\_\_\_'s way?

### **Increase participation of other students in the conversation**

Prompt students for further participation: Would someone like to add on?

Ask students to restate someone else's reasoning: Can you repeat what \_\_\_\_\_ just said in your own words?

Ask students to apply their own reasoning to someone else's reasoning:

Do you agree or disagree, and why?

Did anyone think of this problem in a different way?

Does anyone have the same answer, but got it in a different way?

Does anyone have a different answer? Will you explain your solution to us?

## When else can you use small groups?

The **Mastery Learning Loop** specifies that at the end of each Big Idea chunk you can have a day in which students are in **achievement groups**:

- a. On level and above level students form small groups and engage in independent activities.
- b. The teacher helps struggling students.

I do not use the term *ability* because we do not know how to measure *ability*. We can measure *achievement* at a moment in time.

Find a description of the Mastery Learning Loop on my website under the last header Math Expressions Users.

## When else can you use small groups?

Sometimes you can use flexible grouping including individuals, pairs, or small groups **for practice.**

### **But what is the most important thing in practicing?**

Being able to check your answer so that you do not practice wrong methods.

And then trouble-shooting your solution to find your error.

Getting help if you need it is also important.

**So practice must be organized with these feedback and helping needs available.**



**How can I give feedback to students while they are practicing so that they do not practice errors?**

Have students work on a few problems at a time and discuss or give answers to those problems when most students have finished those problems.

For a part at a time, the teacher or a student writes answers on board from the TE or the TE is projected to show answers.

Help can be available at any time from a nearby classmate or from a circulating student helper.

**How can I give feedback to students while they are practicing so that they do not practice errors?**

Student checkers with a page of answers can go around to students with a hand raised ready to be checked by getting a checkmark on problems. Students need to learn to ask for checking early and twice at least so they know they are on the right path. Students can take turns making the answer sheet. Students with a wrong answer can get help from someone with a right answer.

## **When else can you use small groups?**

Outside of regular class you can spend time with Tier 2 and Tier 3 students to catch them up.

It is also helpful to do some preteaching of current work so that Tier 2 and Tier 3 students feel more comfortable and confident in class.

A nurturing meaning-making visual  
Math Talk Community  
allows you to **individualize within**  
**whole-class discussions:**

Several methods arise and are discussed, and  
you can introduce research-based methods that  
are accessible and mathematically desirable.

With the classroom math talk support, all  
students move to a strong method.

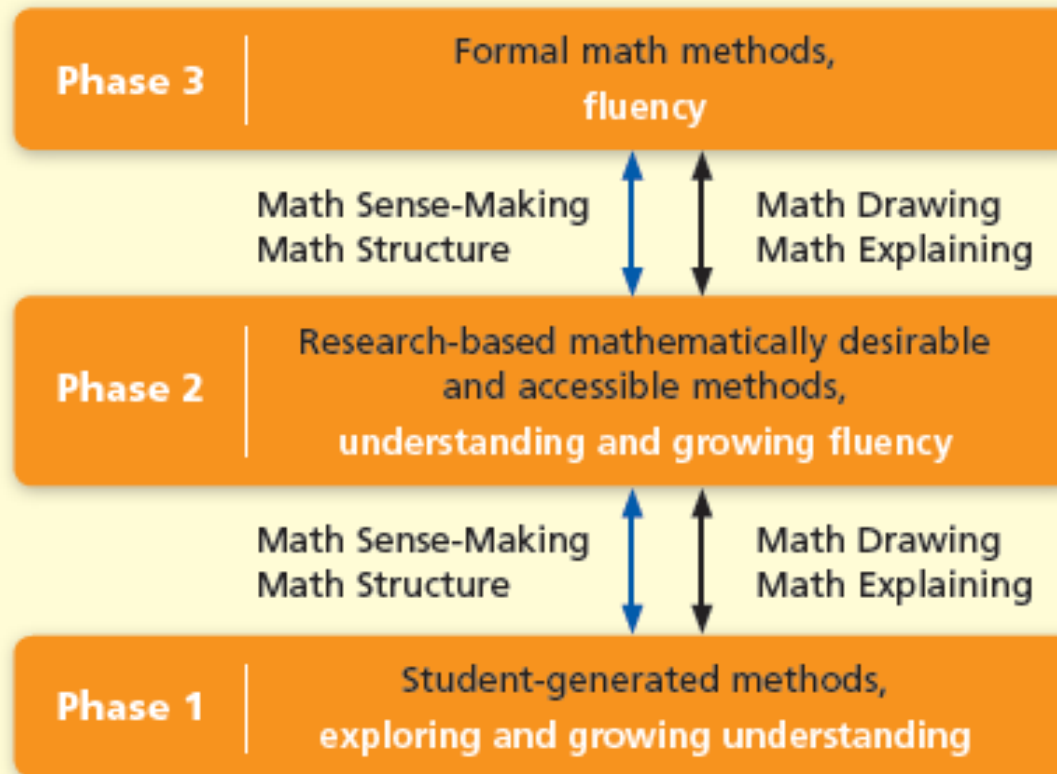
**Learning path teaching means  
class structures vary along the learning path.**

There is no one standard structure  
that fits every day.

**Cookie cutter teaching does not apply to math.**

# Inquiry Learning Path in the Math Talk Community

Bridging for teachers  
and students by coherent  
learning supports



Learning  
Path



Students develop math drawings to show their thinking.

## Mathematical Practices

Math Sense-Making	Math Structure	Math Drawings	Math Explaining
Make sense and use of appropriate precision.	See structure and generalize.	Model and use tools.	Reason, explain, and question.
MP1 Make sense of problems and persevere in solving them. MP6 Attend to precision.	MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.	MP4 Model with mathematics. MP5 Use appropriate tools strategically.	MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others.

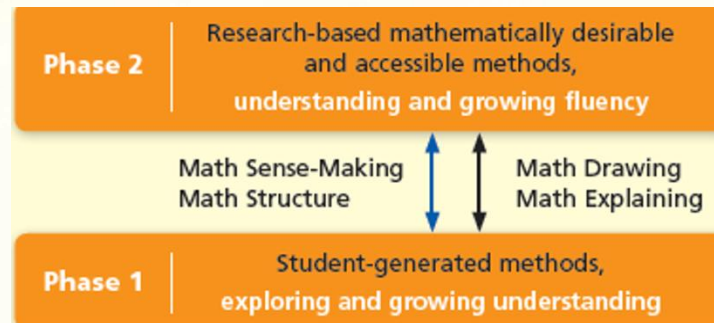
Teachers continually assist students to do math sense-making about math structure using math drawings to support math explaining.

Teachers continually assist students to do **math sense-making** about **math structure** using **math drawings** to support **math explaining**.

# Small Groups in the Inquiry Learning Path Community

## A. Meaning-Making in the Math Talk Community

### Helping small groups



## B. Meaning-Making for strugglers using the Mastery Learning Loop at end of each Big Idea

**Group by achievement for independent groups while you help strugglers**



# Small Groups in the Inquiry Learning Path Community

C. During practice in Phase 3

**Individuals or pairs or small groups**

Phase 3

Formal math methods,  
fluency

Remember to use a method to give feedback and help to students soon after they solve.

D. Outside of class in a regular schedule

**Tier 2 and Tier 3 students to catch them up**

**Do not try to teach lessons to small groups.**  
Small groups are for students discussing and explaining and not the teacher teaching.  
But the teacher does need to assist students to work together as a helping group.

**Assisting your students to help each other learn is one of the most important things you can do.**

Research says that a helping student always learns so helping is important conceptually as well as emotionally.

Classes are different from year to year  
and even over the year.

Some teachers find that independent work is  
best done in a mixture of helping small  
groups, helping pairs, and individuals.

This mixture can be changed from day to day  
as student understanding  
and social needs change.

*Math Expressions* designates some activities as small groups as gentle reminders to try small groups at this point.

However, you know your class best so the decision is really up to you.

But do remember that you are **individualizing within the whole group class** as long as you are using the Math Talk Community with math drawings to support student understanding.

# When and Why to Use Small Groups

**Karen C. Fuson**

Northwestern University  
Professor Emerita

My website is [karenfusonmath.com](http://karenfusonmath.com)  
or [karenfusonmath.net](http://karenfusonmath.net)

*Author of Math Expressions*  
a PK to Grade 6 math program