



Published monthly by
ISBE
Content Specialists

Kindergarten through
Second Grade

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The Teachers' Newsletter

from Illinois Classrooms in Action

Grade band lessons, ideas and information
Focus: Mathematics

Volume VII Issue 7

March 2019

Unobtrusive Assessment

Traditional assessment has been of the obtrusive variety, meaning learning stops for the assessment to occur. This is the typical Friday quiz, unit test and yearly assessment type of assessment. It is generally treated as summative in nature, in that it does not usually drive learning forward, but rather is an assessment to determine what the student has learned.

Research shows that unobtrusive assessment, that which fits in with the learning, is a preferred method of assessment. It

gives the teacher information to drive their further instruction and informs the student on what still needs to be learned.

Observing students while they work or have a discussion is a type of unobtrusive assessment. In mathematics, asking the student to explain their thinking can be a preferred way to assess their understanding of the mathematics rather than just having them select an answer from a list of choices.

White boards are another method of unobtrusive assessment. Students can

solve a problem and hold up their results. The teacher can easily assess who seems comfortable with the task and who needs further learning to occur.

Hands on learning, such as working with manipulatives, or discussing a problem with multiple solutions, can lead to greater learning. All of these can be evaluated through unobtrusive assessment.

You can find more information on unobtrusive assessment in [A School Leader's Guide to Standards-based Grading](#) by Tammy Heflebower.

Concrete, Representational, Abstract to Build Math Fluency

Young students often work with manipulatives when solving mathematics challenges. Research show that for students to retain and transfer this knowledge, they need to follow 3 steps to build fluency.

First, they create a solution using their manipulatives.

Next is the step that is often

overlooked, they draw a representation (**diagram**) of their manipulatives or their thinking.

Finally, they create a number sentence that aligns with their manipulative and diagram work.

Too often, we skip over the representational stage and ask students to write a number sentence aligned to what they

have determined through hand on work with manipulatives. It is a key step that helps students see the connection between hands on and paper and pencil representations.

Here is a good video further explaining CRA.

<https://www.youtube.com/watch?v=weCPBJVSrl>

Connecting Math and Literacy



Math problems are a complex text in our elementary classrooms. In literacy, we ask that students navigate these texts, analyze the problems and persevere in solving them. The primary practice skills can be supported by modeling and allowing students to talk about their thinking and solution.

Another connection is that students must construct viable arguments (both abstractly and quantitatively), critique the reasoning of others (in literacy, this is analysis) and express

regularity in repeated reasoning.

A third connection is to the structure of texts. Students should be able to easily determine the structures used. For example, in literature problem/solution is popular in narrative or informational science texts. This same structure can be used to support certain text types in math.

Teachers should have protocols in place to support a positive classroom climate. Students should have an accepting and safe place to discuss math because

mistakes do occur and there is often more than one path to the correct answer.

Students should be encouraged to have fun with math as they master facts and concepts, understand that all students read and comprehend differently in both math and literacy, and may require a variety of strategies and scaffolds.

Students should have time to read and write about texts they enjoy, including math!

Opportunities should be regularly provided for students to struggle and build stamina.

Mistakes are proof that you are trying.

Author unknown

Strategies to Incorporate Math and Literacy

Greg Tang is an author and mathematical guru. He makes math fun while learning difficult concepts and incorporating literacy. Visit <https://gregtangmath.com/> for more information.

The following suggestions can be found at www.teachthought.com.

1. Allow students to present answers to problems either from classwork or homework. This allows students to share how they arrived at the solution.
2. Ask students to explain a mistake they made. After going over a set of problems, ask the students to take one problem they missed and explain why they missed it. The explanation should include what they did wrong as well as what they should've done instead.
3. Ask students to write down how they solved a problem. After students solve a problem, ask them to write down how they solved it. Teach them how to give a great explanation. The best ones include step-by-step instructions, how the steps apply to the problem, and the why behind them.
4. Allow students to ask each other for help solving problems. Not only does it allow more questions to be answered, but it also helps the student who's giving the explanation to develop a deeper understanding.
5. Use exit slips. They are a great way of gauging understanding at the end of class. Students write an answer to a question and turn it in on their way out the door. Ask a specific content question such as, "Why do you need a common denominator when adding fractions?" Or, ask a reflective question such as "What questions do you have about today's lesson?" Enjoy the discussions!



Shifting the Culture of Mathematics

The culture of mathematics in American classrooms needs to experience a dramatic shift. Here are four important things to remember as we integrate mathematics across subject areas. If we work together to change how mathematics is perceived, our students will grow into life-long learners and problem solvers.

1. Celebrate mathematics as a useful tool in making sense of the world.

Provide opportunities for students to make measurements, understand patterns, analyze data, and quantify

relationships in all subjects—making mathematics relevant to students outside of the math classroom.

2. Facilitate productive struggle. In America, we equate completing something quickly and easily with being smart. Often when students struggle with a skill, they write it off as something they just aren't good at. Encourage students by recognizing learning happens through hard work and perseverance.

3. Recognize that there are many different ways to arrive at the solution.

The journey to the answer and the mathematical reasoning students employ along the way is often as valuable as the answer itself. Validate students unique strategies for arriving at the answer.

4. Create a space where it is safe to make mistakes.

Research shows that mistakes cause our brains to grow. Spend time in class celebrating mistakes, analyzing the reasoning that led to the mistake, and how to correct the error. *Mistakes Grow Your Brain - YouCubed.* (2019). YouCubed. Retrieved 26 February 2019, from <https://www.youcubed.org/evidence/mistakes-grow-brain/>

Math helps us understand the world-and we use the world to understand math.

Understanding the World Through Math. (2019). Asia Society. Retrieved 26 February 2019, from <https://asiasociety.org/education/understanding-world-through-math>

Engaging in Productive Struggle: Number Talks

This [video](#), posted by Teaching Channel, shows a teacher facilitating a number talk using the problem 123-65. As the teacher introduces us to the activity, she says, "There is a correct answer. However within that problem, it's like a rainbow, an array of ways that you can get there." Throughout the video many different strategies are explored and validated. The students are approaching the problem using the skills they are most comfortable with. The teacher uses her talk moves to support students but lets them struggle with the mathematics and work through it on their own. This is great example of an instructional strategy that embraces the cultural shifts mentioned above. *Engaging in Productive Struggle: Number Talks.* (2016). Teaching Channel. Retrieved 26 February 2019, from <https://www.teachingchannel.org/video/subtraction-math-lesson-ousd>

Join us at one of our upcoming free, virtual #ILMathCom events!

Check out www.mathteachersinaction.org/ilmathcom.html to access the complete listing of upcoming events, register for #ILMathCom events, or to watch the recordings of past events.



Science and Mathematics Integration

The National Research Council's *A Framework for K-12 Science Education* states that, "Increasing students' familiarity with the role of mathematics in science is central to developing a deeper understanding of how science works." The Framework goes on to describe the eight Science

and Engineering Practices in which students should use and develop in quality science instructional materials. Two of these practices, Analyzing and Interpreting data and Using Mathematical and Computational Thinking, explicitly describe mathematics practices that students should use

to figure and explain natural phenomenon. In fact, the NGSS is designed to mirror the mathematics content outlined by the Common Core Standards at each grade level. Because of this, science lessons can be an effective and engaging way to apply and reinforce the concepts.

"Increasing students' familiarity with the role of mathematics in science is central to developing a deeper understanding of how science works."
~*A Framework for K-12 Science Education*

What Mathematics Skills Should Students in Grades K-2 Use?

The NSTA has organized a progression of specific elements for each Science and Engineering Practice in the document found here: <http://nstahosted.org/pdfs/ngss/resources/MatrixForK-12ProgressionOfScienceAndEngineeringPracticesIn>

[NGSS.8.14.14.pdf](#)).

Within this matrix you can find the specific ways that K-2 students should be Analyzing and Interpreting Data and Using Mathematical and Computational Thinking in science.

**#ILSciCom
Returns in April!**

Visit

www.scienceteachersinaction.org/ilscicom.html

for more information

Resources for Science and Mathematics Integration

The NSTA maintains a website with a collection of instructional materials that align to the NGSS. NSTA curators evaluate the materials based on their alignment to the Science and Engineering Practices, Disciplinary Core Ideas and Cross Cutting Concepts This can be found here:

<https://ngss.nsta.org/Classroom-Resources.aspx>

One resources that the curators have identified to engage students in the practice of Analyzing and Interpreting Data is "A House for Chase the Dog." In this lesson students analyze and

interpret data to evaluate building materials. The lesson can be found here:

<https://ngss.nsta.org/Resource.aspx?ResourceID=538>

**NGSS@NSTA
STEM STARTS HERE**

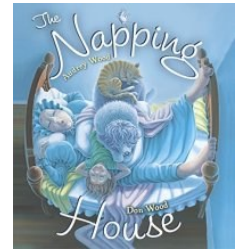
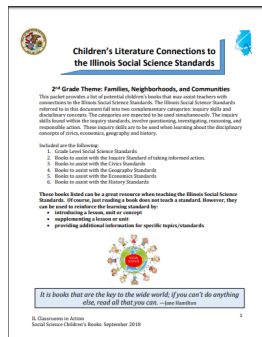
Bridging Social Science and Mathematics

At first glance, there seems to be little connection between the math and social science standards. However, one could argue that there is an increased connection with the addition of the financial literacy component in the new Illinois Learning Standards for Social Science. The previous standards did include an economics strand but did not include or place an emphasis on the financial literacy skills that will become important to students as they grow older.

One of the best ways to begin to address math and financial literacy/economics is through read alouds.

The ISBE Content Specialists have created a

list of children's literature that address the financial literacy/economics strand of social studies and literacy. To access the K-5 *Children's Literature Connections to the Illinois Social Science Learning Standards*, click [here](#), scroll down and choose a grade level.



Economics: Connecting Math and Social Science

The prospect of teaching economics and financial literacy concepts in the classroom is sometimes quite overwhelming and unfamiliar to educators. Many elementary teachers have little background in these topics. However, no matter one's comfort level, teachers can include these topics in many read aloud books or in current social science units.

There are many *FREE* resources that can support teachers with read aloud options, lesson ideas, and even games and activities to incorporate into the classroom. The following websites provide resources to support elementary teachers in the areas of economics and financial literacy:

◆ [EconEd at the St. Louis Fed](#)—This site provides lesson and unit ideas that can be sorted by grade band and/or topic.

1. Click on Economics Education
2. Click on Activities and scroll to find resources that assist you in the classroom.

The site also provides access to EconLowdown which provides award-

winning *FREE* online courses and videos for use in K-12 and college classrooms. Check out the Teacher Ed button for professional development opportunities!

◆ [Econ Illinois](#)—Econ Illinois offers many programs and workshops for Illinois teachers to integrate the teaching of economics and personal finance across the curriculum in grades K-12. They also include access to their four key signature programs: The Stock Market Game, Economics Concepts Poster Contest, Illinois Econ Challenge, and the Illinois Personal Finance Challenge. The Poster Contest brings economics and personal finance to life as students in grades 1-8 learn more about the economy through their participation. The Professional Development tab provides information about conferences and workshops across Illinois.



The number one problem in today's generation and economy is the lack of financial literacy.

Alan Greenspan

Social Emotional Learning within Mathematics

Teaching and Learning Supports



Kindergarten through Second Grade

Multiple student communication skills listed in the Illinois Math Practice 3 standard are able to be aligned to (developmentally appropriate) Illinois Social Emotional Learning standards. Two classroom in action designed tools are highlighted below to assist classroom teaching and learning for these skills.

Illinois Math Practice 3	Illinois SEL standards/benchmarks
Construct viable arguments and critique the reasoning of others.	Use listening skills to identify the feelings and perspectives of others.
Justify conclusions, communicate them to others, and respond to the arguments of others.	Identify ways to work and play well with others. (2C.1a)
Listen/read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	Demonstrate appropriate social and classroom behavior. (2C.1b)

Tools to support both MP3 and SEL skills

Collegial Discussion Guide

Conversation Cubes

Free download at:

Available at:

<http://bit.ly/ILSELdiscguide>

<http://bit.ly/CIAonlinestore>

Collegial Discussion

Common Core State Standards for Speaking and Listening Item 1 (CCS-SL.1) calls for students to initiate and participate effectively in a range of collaborating discussions with diverse partners. They are to work with peers to promote civil, democratic discussion and decision-making, set clear goals and deadlines, and establish individual roles as needed. CCS-SL.1 also calls for students to follow rules for collegial discussions. Collegial discussions are mutually respectful conversations between student colleagues in a group or classroom environment.

Discussion Guidelines and Skills	Discussion Sentence Stems.....
<p>When speaking, participants strive to</p> <ul style="list-style-type: none"> sustain a main idea be original with interesting, thought-provoking ideas. have quality in their comments. include textual references—the more specific the quotation, with reference to page and paragraph numbers, the better. make reference to other works. maintain the accuracy of their comments. question for greater understanding. <p>When listening, participants strive to</p> <ul style="list-style-type: none"> listen to other students and not be “checked out”. see how the comments fit...follow the flow of the discussion. be able to reference previous comments. listen for greater understanding. wait patiently for the speaker to finish before sharing ideas. <p>In a collegial conversation, participants</p> <ul style="list-style-type: none"> are consistent in participation. show leadership—students help others to enter the discussion. show empathy. have the ability to learn and adjust to the dynamics of the class. incorporate politeness and respect for all members of the class. maintain eye contact and call others by their names. show patience with the process. (It takes some time to develop a group dynamic where everyone feels at ease.) demonstrate preparedness—books and articles are marked, responses are written, questions are prepared. students are willing to state own ideas even if different from those of other students or the teacher. 	<p>Sentence starters for students to facilitate a safe and cooperative classroom or group discussion.</p> <p>Agreement</p> <ul style="list-style-type: none"> “I agree with _____ because _____.” “I like what _____ said because _____.” “I agree with _____ because _____ then on the other hand _____.” <p>Disagreement</p> <ul style="list-style-type: none"> “I disagree with _____ because _____.” “I’m not sure I agree with that because _____.” “I can see that _____; however, I disagree with (or can’t see) _____.” <p>Clarifications</p> <ul style="list-style-type: none"> “Could you please repeat that for me?” Paraphrase what you heard and ask, “Could you explain a bit more, please?” “I’m not sure I understood you when you said _____. Could you say more about that?” “Is there evidence for the position?” “How does that support our work/mission at _____?” <p>Confirmation</p> <ul style="list-style-type: none"> “I hear _____.” “I believe _____.” “I discovered _____.” “I learned that _____.” <p>Confusion</p> <ul style="list-style-type: none"> “I don’t understand _____.” “I am confused about _____.” “Can you explain that another way?” “I have a question about _____.” <p>Extension</p> <ul style="list-style-type: none"> “I was thinking about what _____ said, and I was wondering what if _____.” “This makes me think _____.” “I want to know more about _____.” “Now I am wondering _____.” “Can you tell me more about _____?” <p>Review</p> <ul style="list-style-type: none"> “I want to go back to what _____ said.” “I like _____.” “I noticed that _____.”



Check us out on the web under Climate and Culture: [Illinois Classrooms in Action](http://IllinoisClassroomsInAction.org)

