

Authenticity in Math Through LEARN Strategies

Brittany VanCleave
Published by *K20 Center*

This work is licensed under a Creative Commons CC BY-SA 4.0 License

Time Frame 2-3 hours

Essential Question(s)

How can LEARN strategies increase student engagement and academic performance in middle school math classes?

Summary

This professional development session focuses on instilling an understanding of the framework of authentic learning through multiple tools, such as the 5E Model and LEARN Strategies, while keeping in mind the Oklahoma Academic Standards for Mathematics. The interactive session will give participants the tools and skills they need to take back to their classrooms to increase students' depth of knowledge and academic performance.

Learning Goals

- Participants will be able to identify instructional strategies modeled that support authentic instruction and Oklahoma Academic Standards for Mathematics.
- Participants will be able to apply the LEARN strategies and reflect on this experience to determine the relevant components of authenticity.
- Participants will create a plan for implementing a LEARN strategy in their classroom.

Attachments

- Authentic Lesson Reflection Tool—Authenticity in Math through LEARN Strategies.pdf
- Commit to a Strategy—Authenticity in Math through LEARN Strategies.docx
- Commit to a Strategy—Authenticity in Math through LEARN Strategies.pdf
- Distributive Manipulation Explore Cards (Sharing Is Caring)—Authenticity in Math through LEARN Strategies.docx
- Distributive Manipulation Explore Cards (Sharing Is Caring)—Authenticity in Math through LEARN Strategies.pdf
- Distributive Manipulation Explore Extended (Sharing Is Caring)—Authenticity in Math through LEARN Strategies.docx
- Distributive Manipulation Explore Extended (Sharing Is Caring)—Authenticity in Math through LEARN Strategies.pdf
- Four Corners Signs (Going Viral)—Authenticity in Math through LEARN Strategies.docx
- Four Corners Signs (Going Viral)—Authenticity in Math through LEARN Strategies.pdf
- Instructional Strategy Notes—Authenticity in Math through LEARN Strategies.docx
- Instructional Strategy Notes—Authenticity in Math through LEARN Strategies.pdf
- Instructional Strategy Scavenger Hunt—Authenticity in Math through LEARN Strategies.docx
- Instructional Strategy Scavenger Hunt—Authenticity in Math through LEARN Strategies.pdf
- Linear Inequalities—Authenticity in Math through LEARN Strategies.docx
- Linear Inequalities—Authenticity in Math through LEARN Strategies.pdf
- Pass the Problem (Going Viral)—Authenticity in Math through LEARN Strategies.docx
- Pass the Problem (Going Viral)—Authenticity in Math through LEARN Strategies.pdf
- Session Slides—Authenticity in Math through LEARN Strategies.pptx
- Soft Skills Drawing Strips—Authenticity in Math through LEARN Strategies.docx
- Soft Skills Drawing Strips—Authenticity in Math through LEARN Strategies.pdf
- Toys vs. Us (How Big Should I Be)—Authenticity in Math through LEARN Strategies.docx
- Toys vs. Us (How Big Should I Be)—Authenticity in Math through LEARN Strategies.pdf

Materials

- Session Slides (attached)
- Authentic Lesson Reflection Tool (attached; one per participant)
- Linear Inequalities cards (Pie > Everything, Part 1) (attached; one set per participant)
- Commit to a Strategy handout (attached; one per participant)
- Distributive Manipulation Explore Cards (Sharing Is Caring) (attached; one per pair of participants)
- Distributive Manipulation Explore Extended symbols (Sharing Is Caring) (attached; optional)
- Four Corners Signs (Going Viral) (attached)
- Instructional Strategy Notes (attached; one per participant)
- Instructional Strategy Scavenger Hunt handout (attached; one per participant)
- Pass the Problem (Going Viral) handout (attached; one per participant)
- Soft Skills Drawing Strips (attached)
- Toys vs. Us (How Big Should I Be) handout (attached; one per small group)
- Large poster pads, poster paper, whiteboard space, or similar (attached; one per participant)
- Action figures, dolls, or similar human-like toys (one per small group)
- Dice (3 per small group, including 2 of a single color and 1 of a different color)

Engage

Presenter's Note: Activity Preparation

Before you begin this session, use Mentimeter's free services to prepare a poll for participants. Use the "Word Cloud" presentation type. Input the question, "*What characteristics do you want your students to exhibit in your classroom?*" Enable participants to submit five entries apiece. When you're finished creating your Mentimeter presentation, click "Share" to find your presentation's digit code, voting link, and QR code. Make one or more of these codes/links available in the Activity Slides to allow participants to access your poll.

Optional: Sticky Note Discussion

If you do not have a Menti account and do not wish to create one, you can ask your participants to answer the question on a sticky note or have them discuss in a group. Visualizing the final result with a word cloud is helpful, but not necessary.

Use the attached **Activity Slides** to guide participants through the session. Begin with **slide 4**. Invite participants to take your prepared Mentimeter poll using www.menti.com. Have participants answer the question, "*What characteristics do you want your students to exhibit in your classroom?*" by submitting five separate entries. Once participants are finished, show the complete word cloud created by their answers. If possible use this world cloud as a starting point of discussion about how important it is for students to exhibit soft skills such as critical thinking, the ability to collaborate, etc.

After the discussion, move to **slide 5.** Briefly, read aloud the essential question on this slide: "*How can LEARN strategies increase student engagement and academic performance in middle school math classes?*" Move to **slide 6** and discuss the objectives on the slide. Let participants know what they can expect from the session.

Explore

Presenter's Note: Activity Structure

This phase involves six lessons with a different learning strategy embedded within each. These six lessons are "How Big Should I Be?," "Get in Line," "Sharing Is Caring," "Going Viral," "Pie > Everything, Part 1," and "Popcorn > Raisinets." You may find it helpful to read through these lessons beforehand so that, if needed, you can inform participants about how the strategies are used more broadly in association with each standard and lesson.

Optional: Focusing on Strategies

If time does not allow you to cover every strategy in this section, decide which strategies you feel are most important to show to participants in the time available.

Move to **slide 8**. Briefly introduce the lesson "How Big Should I Be?"

Move to **slide 9**. Invite participants to engage in the strategy Think-Pair-Share. Click on the slide (also found here: link) to watch the Fortnite game trailer (stop the video at the 1:20 mark). After watching the video, ask participants to do the following:

1. Answer the question on the slide individually. ("*Do the characters look real? Why or why not?*")
2. Share your answer with a peer.
3. Share your answer with the whole group.

Move to **slide 10**. Have participants form small groups. Pass out a copy of the attached **Toys vs. Us (How Big Should I Be)** handout to each group, and have each group pick out a doll or action figure to use. Invite groups to measure and record their toy's height, arm length, etc. according to the chart on the handout. Then, have participants measure their own (or a group member's) height, arm length, etc. Ask each group to develop a plan to determine if the toy is proportional to their own body's measurements. Using the Claim, Evidence, Reasoning, (CER) strategy, invite each group to make a claim about whether or not the toy is proportional, back up this claim with evidence, and provide reasoning for their claim.

Move to **slide 11**. Briefly introduce the lesson "Get in Line."

Move to **slide 12**. Using the next strategy, I Notice, I Wonder, invite participants to create a T-chart with the left-hand column labeled "I Notice" and the right-hand column labeled "I Wonder." Ask participants to look at the picture on the slide and write down everything they notice in the "I Notice" column. In the "I Wonder," column, invite participants to pose questions they have about the picture.

Move to **slide 13**. Briefly introduce the lesson "Sharing Is Caring."

Move to **slide 14**. As the presenter, walk through the Explore portion of the lesson (link here: Sharing is Caring). Using the next strategy, Elbow Partners, invite participants pair up with an Elbow Partner to take part in the activity. Pass out a copy of the attached **Distributive Manipulative Explore Cards (Sharing Is Caring)** to each pair. Have one partner roll the dice and plug the resulting numbers into different slots of the equations. Then, invite the other Elbow Partner to solve the problem. Ask partners to rotate back and forth between the dice-roller and problem-solver roles as they move from one problem to the next.

Optional: Distributive Manipulation Explore Extended

To extend this activity, you may choose to cut the Distribution Manipulation Explore Cards in half (if you have not already done so) and print and cut out the attached **Distributive Manipulation Explore Extended** symbols. Have participants randomly draw a number of equations and plus or minus symbols, placing the (+) or (-) symbols between equations to create a much longer equation to simplify. To simulate a review of two-step equations, give participants an (=) sign and another die, so that they can then solve the equation.

Presenter's Note: Activity Preparation

Before the next activity starts, prepare by printing out the attached **Four Corners Signs (Going Viral)**. Hang one of these signs in each corner of the room. You may also choose to write on whiteboard spaces in each corner of the room or a similar method.

Move to **slide 15**. Briefly introduce the "Going Viral" lesson.

Move to **slide 16**. Ask participants to examine the image on the slide and determine which group of coins does not belong. Using the prepared Four Corners signs or whiteboard spaces in different corners of the room, use the Four Corners strategy to designate a different corner of the room to represent each picture. Have participants walk to the corner that represents their choice and discuss their reasoning.

Move to **slide 17**. Introduce participants to the Pass the Problem strategy in the same lesson. Pass out a copy of the attached **Pass the Problem (Going Viral)** handout to each participant. Have participants do the following:

1. Solve the first line of the handout, then pass the handout to another participant.
2. Solve the second line, then pass again.
3. Solve the third line, then pass again.

Presenter's Note: Activity Preparation

Before the next activity starts, review the attached **Linear Inequalities** cards. Cut out one set of cards for each participant. Consider using plastic baggies or a similar method to keep each set together.

Move to **slide 18**. Briefly introduce the "Pie > Everything, Part 1" and "Popcorn > Raisinets" lessons.

Move to **slide 19**. Pass out the prepared Card Sort sets to participants. Using the Card Sort strategy, invite participants to match each inequality expression with its equation.

Move to **slide 20**, and have participants read the prompt on the slide and graph a solution. Move to **slide 21** and repeat. Move to **slide 22**. Using the Create the Problem strategy, invite participants to follow the instructions on the slide and create their own two-variable movie scenarios for others to solve. Allow time for them to finish. Then, have participants post their scenarios around the room. Move to **slide 23**. Using the Gallery Walk strategy, have participants walk around the room to view and solve their peers' scenarios.

Move to **slide 24**, which shows the strategy Muddiest Point. Utilizing this strategy, have participants write down anything from the PD so far that still confuses them and where they might need help in the future when using one of the strategies.

Explain

Move to **slide 26**. After you have walked through each strategy, ask each participant to choose a strategy to reflect on. Move to **slide 27**. Have participants work with an Elbow Partner and answer the questions on the slide from a student's perspective:

1. *Does this activity allow students to learn math on a higher level?*
2. *Does this activity allow students to try things out, build autonomy, and experience cognitive struggle?*
3. *Does this activity allow students to participate in a discussion?*

Give pairs time to reflect with their partners. Then, have a brief group discussion over participants' answers.

Move to **slide 28**. This time, have pairs answer the question on the slide from a teacher's perspective:

1. *What are some barriers that might occur within the strategy?*

Again, give pairs time to discuss their barriers and how they might overcome each barrier. Try to make sure that participants consider both sides—the teacher's and the student's—to fully analyze the strategy.

Move to **slide 29**. After reflecting on both perspectives, invite participants to analyze the strategies based on the Authentic Reflection Tool shown on the slide, passing out a copy of the attached **Authentic Reflection Tool** to each participant. Move to **slide 30** and have participants apply the guiding questions on the slide in their reflections:

- Use the lesson reflection tool to think about the ways in which this activity lines up with the components of authenticity.
- *How could this activity be modified to make it even more authentic?*
- *How could this activity have been done with the use of technology?*

Extend

Presenter's Note: Activity Preparation

Before you begin this phase of the lesson, print out a copy of the attached **Soft Skills Drawing Strips** (one copy for every 30 participants). Cut these strips out and mix them up in a hat or similar container for participants to draw from. Additionally, hang or position six large blank poster pads or papers around the room (or utilize blank whiteboard spaces). Label each of these pads or whiteboard spaces with one of the following: "Critical Thinking," "Collaboration," "Reasoning," "Reflection," and "Problem Solving."

Move to **slide 32**. Invite participants to return to the first scenario; this time, however, they should answer the question as a teacher instead of a student. Have participants again turn to their Elbow Partners and finish the following statement:

- In order for my students to have these skills, teaching and learning should look like...

Move to **slide 33** and have participants navigate to the LEARN website (https://learn.k20center.ou.edu/) on their devices. Move to **slide 34**. Regroup participants based on what they teach. Have each participant draw out two slips of paper from the prepared container. These two slips of paper are the two soft skills on which participants should focus during the first part of this activity.

After everyone has obtained two soft skills, walk the group through how to use the LEARN website and how to use the advanced filter in order to focus on a few strategies to research. Pass out a copy of the attached **Instructional Strategy Scavenger Hunt** handout to each participant. Invite participants to find strategies on the LEARN repository that they like based on their soft skills and take notes on their Scavenger Hunt handouts. Then, invite participants to visit the prepared posters with their soft skills listed and write down the strategies they liked for the listed skill.

Pass out a copy of the attached **Instructional Strategy Notes** handout to each participant. After everyone has written down their strategies on the posters around the room, have participants share out the example strategies on the poster that is nearest to them. Invite participants to add new strategies to their Instructional Strategy Scavenger Hunt handout as their peers share the strategies associated with each of the soft skills.

Evaluate

Move to **slide 36**. Pass out a copy of the **Commit to a Strategy** handout to each participant. Ask participants, working individually, to choose three strategies to use in their classrooms, decide which standards they will adhere to while using those strategies, and describe exactly how they will use them.

Follow-up Activities

Give participants a chance to voice what they'd like to see during the next PD session. When participants come back together as a whole group, invite the group to reflect on and talk about the strategies they chose to implement in their classrooms.

Research Rationale

Instructional strategies engage students and provide opportunities for them to make connections to new information using their prior knowledge as a foundation. They make thinking visible to themselves, peers, and teachers (Keeley & Tobey, 2011, p. 171). Teachers can use instructional strategies to gain an idea of what the students know and need to learn. By doing this, they can target instruction and provide opportunities to build on students' prior knowledge. Instructional strategies can be used as a formative assessment, quickly assessing the students' understanding and providing teachers with a guide to develop further instruction and support as needed, and they can help students identify and monitor their own learning throughout lessons and units. Instructional strategies create an authentic learning and teaching environment for all students.

Resources

- IGN. (2017, July 8). Fortnite official cinematic trailer. [Video]. YouTube. https://www.youtube.com/watch?v=qpKtzf5fXn4
- K20 Center. (n.d.). Card sort. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f506976b
- K20 Center. (n.d.). Claim, evidence, reasoning (CER). Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f506fc09
- K20 Center. (n.d.). Create the problem. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f506ae04
- K20 Center. (n.d.). Elbow partners. Strategies. https://learn.k20center.ou.edu/strategy/ccc07ea2d6099763c2dbc9d05b00c4b4
- K20 Center. (n.d.). Four corners. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f5064550
- K20 Center. (n.d.). Gallery walk / carousel. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f505a54d
- K20 Center. (n.d.). I notice, I wonder. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f507d1a7
- K20 Center. (n.d.). Muddiest point. Strategies. https://learn.k20center.ou.edu/strategy/baee4e90c5fa1a7060ca04dd8b003a81
- K20 Center. (n.d.). Pass the problem. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f506c28b
- K20 Center. (n.d.). Think-pair-share. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f5064b49
- Keeley, P. & Tobey, C. R. (2011). Mathematics formative assessment, volume 1: 75 practical strategies for linking assessment, instruction, and learning. Thousand Oaks, CA: Corwin, A SAGE Company