

# [Neriage](#)

## **Neriage Discussion and Lesson Summary (about 30-45 minutes)**

Perhaps the most difficult aspect of a problem-solving lesson is “*neriage*” (pronounced nary-ah-gay) – a Japanese term for “kneading” or “polishing” students’ ideas through discussion. As shown in the figure “Beyond Show and Tell,” *neriage* occurs *after* students come up with solutions to the problem. Japanese teachers and researchers “believe that the heart of the lesson begins *after* students come up with solutions” (Takahashi, ICME 11). The point of a problem-solving lesson is *not* simply to solve the problem; it is to develop important mathematical ideas, through *neriage*.

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To plan the *neriage*, revisit the anticipated student responses you generated as well as your thoughts about the big mathematical ideas to be built by the research lesson. Your [unit plan template](#) should have notes from this work. The job of *neriage* is to help students build a bridge from their current solution methods to the big mathematical ideas. Choose two lessons from your unit plan for which you would like to plan *neriage*. Item 8 of the [unit plan template](#) provides a lesson flow section for each of your chosen lessons. For each lesson, confirm:

- The new mathematical idea(s) you hope students will come to understand through solving and discussing the problem; and
- The ideas students already understand that provide a starting point for learning this new idea(s).

Then plan the *neriage*:

- Choose and sequence the solution strategies students will be asked to share on the board. Be clear on your rationale for the choice and sequence of strategies. Record your decisions in the unit plan template section labeled “*neriage*” (the third section within item 8, Flow of the Lesson).
- Note the teacher questions and moves that will help students present, unpack, compare, and analyze the solution strategies (under “Teacher’s Support/Questioning” within item 8 of the lesson plan template).
- Specify what you want students to notice about each solution approach and about the similarities or differences between them (under Points of Evaluation within item 8 of the lesson plan template).

As you plan the *neriage*, it may be helpful to recall that its purpose is for students to uncover important mathematical ideas as they analyze and compare solutions, and that “The teacher’s role is not to point out the best solution but to guide the discussion toward an integrated idea” (Shimizu, 1999, p., 110). It may also be helpful to visit (or revisit) the *neriage* from lesson 2 of the 3-lesson series “Can You Find the Area?” embedded below. Consider why Akihiko Takahashi chose these four student solutions (uploaded as two files, [Part A](#) and [Part B](#)) to be shared on the board and what are the mathematical points to be elicited, and then watch the video below (your instructor will provide you with a password).

[Can You Find the Area? – Video Segment 5](#) from [Shelley Friedkin](#) on [Vimeo](#).

## Lesson Summary

Planning the *neriage* leads naturally to planning the **lesson summary**-identifying the big ideas(s) you want students to take away from the lesson. For example, to summarize a lesson focused on finding the area of an L-shaped figure, Dr. Takahashi drew out the ideas that:

- The L-shape can be split up in different ways, yielding different mathematical expressions, but these different solution methods yield the same total area;
- The L-shape can also be seen as part of a larger rectangle, so that rectangular areas can be subtracted to find the total area.
- Addition and multiplication can both be used to find rectangle area, but the more efficient strategy of multiplication cannot be used for the L-shape without first decomposing (or composing) rectangles.

A clear summary of key ideas from the lesson on the board helps students make sense of what was learned (and capture it for later study in their notes). Drawing the summary from students' own comments and work is especially powerful. The lesson template provides a place to record the lesson summary at the end of each lesson in item 8 (Flow of the Lesson).