

Use and Connect: Pose purposeful questions

Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships. In effective teaching, teachers use a variety of question types to assess and gather evidence of student thinking, including questions that gather information, probe understanding, make the mathematics visible, and ask students to reflect on and justify their reasoning.



The types of questions teachers ask matter. Teachers tend to ask *Gather Information* and *Probing Thinking* questions. However, each of the four types is important. Teachers must ask more *Making the Mathematics Visible* and *Encouraging Reflection and Justification* questions.



The patterns of questions teacher use matter. Teachers should use

- **LESS OF** the Initiate-Response-Evaluate (I-R-E) pattern of questioning
 - Asking a *Gathering Information* question, student responds, teacher evaluates the response.
- **LESS OF** the Funneling pattern of questioning
 - Using a set of questions to lead students to a desired procedure or conclusion.
- **MORE OF** the Focusing pattern of questioning
 - Attending to students' thinking, pressing them to communicate clearly, and expecting them to reflect on their own and classmates' thoughts.

Leinwand, S. Brahier, D., & Huinker, D. (2014). *Principles to Actions: Ensuring Mathematical Success for All*. Reston, VA: National Council of Teachers of Mathematics.

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What are teachers doing?

Advancing students' understanding by asking questions that build on, but do not take over or funnel, student thinking.

Making certain to ask questions that go beyond gathering information to probing thinking and requiring explanation and justification.

Asking intentional questions that make the mathematics more visible and accessible for student examination and discussion.

Allowing sufficient wait time so that more students can formulate and offer responses.

What are students doing?

Expecting to be asked to explain, clarify, and elaborate on their thinking.

Thinking carefully about how to present their responses to questions clearly, without rushing to respond quickly.

Reflecting on and justifying their reasoning, not simply providing answers.

Listening to, commenting on, and questioning the contributions of their classmates.

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