



Kentucky Mathematics Innovation Practice Profile



Purpose: Based on the eight mathematics teaching practices from the National Council of Teachers of Mathematics (NCTM), this document operationalizes quality math instruction in the classroom. It can be used to support the implementation of any mathematics innovation.

Mathematics Teaching Practice 1: Establish mathematics goals to focus learning

Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

Accomplished Use

1. Teacher *consistently* ...
 - a. establishes clear and detailed goals that indicate the mathematics students are learning.
 - b. explains how the mathematical goals contribute to enduring understandings.
 - c. uses these goals to adjust instruction.
 - d. connects concrete and semi-concrete (representational) activities to the conceptual understanding of the mathematical goals.
 - e. uses a concrete--semi-concrete (representational)--abstract learning progression to meet these goals.

Mathematics Teaching Practice 2: Implement tasks that promote reasoning and problem solving

Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

Accomplished Use

2. Teacher *consistently*...
 - a. provides opportunities for students to explore and solve problems that build on and extend their current mathematical understanding.
 - b. selects tasks that provide multiple entry points.
 - c. poses tasks that require a high level of cognitive demand.
 - d. provides opportunities for students to discuss tasks without taking over student thinking.
 - e. selects tasks that allow students to make sense of and solve using varied approaches and strategies.

Mathematics Teaching Practice 3: Use and connect mathematical representations

Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

Accomplished Use

3. Teacher *consistently*...

- a. selects tasks that allow students to choose representations (pictures, symbols, verbal, real-life situations, physical models) in making sense of problems.
- b. allocates instructional time for students to use, discuss, and make connections among representations.
- c. introduces and models a variety of representations that provide students with choices for making sense of problems.
- d. asks students to use multiple representations to make connections, justify their reasoning, and deepen understanding of essential features and structure of mathematical concepts and procedures.

Mathematics Teaching Practice 4: Facilitate meaningful mathematical discourse

Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

Accomplished Use

4. Teacher *consistently* ...

- a. engages students in purposeful discourse of mathematical ideas, reasoning, and approaches.
- b. facilitates discourse among students by positioning them as authors of ideas, who explain and defend their approaches.
- c. makes connections among student approaches and reasoning clearly and explicitly.
- d. selects and sequences “evidence of student thinking” to highlight mathematical ideas and language for whole class analysis and discussion.

Mathematics Teaching Practice 5: 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.

Accomplished Use

5. Teacher *consistently* ...

- a. advances student understanding by asking questions that build on, but do not take over or funnel, student thinking.
- b. assesses thinking by asking questions that require explanation and justification.
- c. asks intentional questions that make mathematical ideas and relationships more visible for students.

Mathematics Teaching Practice 6: Build procedural fluency from conceptual understanding

Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

Accomplished Use

6. Teacher *consistently* ...

- a. provides students with opportunities to use their own reasoning strategies and methods for solving problems.
- b. asks students to discuss and explain why the procedures that they are using work.
- c. connects student-generated strategies and methods to more efficient procedures as appropriate.
- d. uses an intentional concrete-semi-concrete (representational)-abstract sequence to develop student understanding of the structure within procedural fluency.
- e. provides students with regular opportunities for practice of procedures that are brief, engaging, and purposeful.

Mathematics Teaching Practice 7: Support productive struggle in learning mathematics

Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Accomplished Use

7. Teacher *consistently* ...

- a. gives students time to struggle with tasks.
- b. asks questions that purposefully scaffold students' thinking without stepping in to do the work for them.
- c. helps students develop a growth mindset by facilitating discussions on mistakes, misconceptions and struggles, and acknowledging students for their efforts (rather than an innate ability).
- d. provides specific feedback that supports students with moving learning forward to develop mathematical ideas and/or persevering to solve problems.

Mathematics Teaching Practice 8: Elicit and use evidence of student thinking

Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

Accomplished Use

8. Teacher *consistently* ...

- a. elicits appropriate evidence of student understanding at strategic points during instructional time.
- b. uses this evidence to adjust instruction to support and extend student learning.
- c. provides students opportunities to reflect on their work to capture understanding and misconceptions.

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