Constructing and Using Content Progressions for Teaching and Learning Math

NCTM, 2018
“An excellent mathematics program includes a curriculum that develops important mathematics along coherent learning progressions and develops connections among areas of mathematical study and between mathematics and the real world.”

Guiding Principles for School Mathematics

NCTM

Principles to Actions
How do we define a Learning Progression?

“A learning progression is a sequenced set of subskills and bodies of enabling knowledge that, it is believed, students must master en route to mastering a more remote curricular aim.”

James Popham
Transformative Assessment
In this session you will...

- **learn** how our district is defining, developing, and using conceptual learning **progressions**,  
- **do** some **math** thinking and construct a learning progression with your peers,  
- and **understand** that **ownership** of curriculum is key to high quality instruction.
Meet Us...

Nicole Caulfield
K-6, Instructional Coach

John Ulbright
K-12, Math Specialist

MSD of Wayne Township
(Indianapolis)
What will that level of engagement look like for you today?
Why Learning Progressions?

- Student learning
- Lack of content knowledge
- Differentiation struggles
- Formative assessment
- Ownership of curriculum
Standards
Units
Student Success
Flexible Content
Knowledge
Ownership
Voice and Choice
Our Process

● One unit at a time
● 1-2 hours, depending on the building
● Players:
  ○ Team of teachers (grade or course)
  ○ Math “expert” (usually John)
  ○ Coach (like Nicole)
Our Process

- Read Standards
A quick note about the problems...
Our Process

● Read Standards
● Solve Problems
● Record “Knows” and “Dos”
Our Process

- Read Standards
- Solve Problems
- Record “Knows” and “Dos”
- Discuss and Order
Our Process

- Read Standards
- Solve Problems
- Record “Knows” and “Dos”
- Discuss and Order
  - Link problems to subskills and enabling bodies of knowledge
Our Process

- Read Standards
- Solve Problems
- Record “Knows” and “Dos”
- Discuss and Order
- Link problems to subskills and enabling bodies of knowledge
- Write Curricular Aim (“Students…””)
Our Process

- Read Standards
- Solve Problems
- Discuss and Order
- Link problems to subskills and enabling bodies of knowledge
- Identify the Curricular Aim
- Identify Look-fors

**Students understand the significance of a remainder**

Based upon their understanding of this, students can...

- Anticipate when division problems will result in remainders by using estimation, number sense, their knowledge of divisibility, etc.
- Make decisions about how to interpret the result of a division problem
- Consider the size of the divisor when interpreting the size of the remainder
Next Steps

The team...

- considers formative assessment
- and plans instruction.
Putting it together

With a shared vision for the unit in place, we now assemble our work into a learning progression.
Our Case for Learning Progressions

- Increased student learning
- Building content knowledge
- Improved differentiation
- Opportunities for formative assessment
- Ownership of curriculum
Checklist...

CONCEPTUAL LEARNING PROGRESSIONS

In one sentence
- This framework creates conditions for teachers and coaches to learn about content, how students might learn the content, and how content is effective and efficient ways.

Related research
- Why learning progressions are important
  - Transformative Assessment, James Popham
  - Resources for how students construct understanding of mathematics: Elemenntary and Middle School Mathematics: Teaching Developmentally, 3rd Ed., by Van de Walle, J., Karp, K., Bay Williams, E.
  - Resources for exemplary problem solving: Illustrative Mathematics and OpenMiddle.com

How are these learning progressions used by coaches?
- Design and develop content knowledge among teachers
  - Individually (within a team) and collaboratively (within a school)
  - Budget free time to build and assess student understanding
  - Create opportunities for purposeful, common formative assessment
  - In-reflection and out-of-reflection instruction

How are these learning progressions used by teachers?
- Take ownership of math curriculum and match it to student learning
  - Plan for coherent instruction and assessment and maintain

Planning

Implementation
Our Challenges

- Teacher time
- Facilitator time
- Maintaining coaching posture
- Flexible thinking
- Admin buy-in
Our Next Steps

- Sustainability and teacher capacity
- More focus on planning and assessment
- Student-friendly progressions
Questions and/or Comments?

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