Using Learning Goals to Inform Instruction

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Overview

What we mean by learning goals

Specifying learning goals

Why learning goals are important

What are learning goals?

Conceptual learning goals are not about performance

(Hiebert et al., 2007).

e.g., Students will be able to complete the following task by the end of the lesson.

WRITE A STORY PROBLEM TO **REPRESENT** THE FOLLOWING NUMBER SENTENCE AND USE A PICTURE TO SOLVE THE PROBLEM.

14X6=?

Conceptual learning goals are more than understanding “how” to do something

Procedural learning goal:
Students will understand how to compare fractions.

Conceptual learning goal:
Students will understand that the numerator represents the number of pieces and the denominator represents the size of the pieces.

Learning goals are about the content teachers want students to understand (Hiebert et al., 2007).

e.g., Students will understand the repeated addition meaning of multiplication

1. In the number sentence aXb=c, *a* represents the number of groups of a certain size, *b* represents the size of the groups, and *c* represents the total.
2. The size of the groups must be the same.

Some learning goals are not specified enough to distinguish conceptual from procedural understanding

(Stein & Meikle, 2017)

Students will be able to **explain** why the common denominator algorithm works for subtraction of fractions.

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Students will be able to **explain** why the common denominator algorithm works for subtraction of fractions.

- To be able to add two fractions, we need same-sized pieces to be able to compare them
- Once the fractions are written in terms of the same-sized pieces, we can then compare the numerators because they are of the same size.

Teachers have other types of goals for students (Lampert, 2001)

e.g., social justice goals

"Relating math to all cultures so students can be involved" (Bartell, 2013, p. 139).

Rate Problem - Solve

Joe, Sarah, and Alex each counted 30 beans.

Joe took 20 seconds.

Sarah took 24 seconds.

Alex took 15 seconds.

Who was fastest?

Taken from Inside Mathematics (http://www.insidemathematics.org/classroom-videos/public-lessons/6th-grade-math-rates-lipman/lesson-part-2)

Rate Problem - Write learning goal(s)

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What are Mr. C's learning goals?

Use students' responses and work to specify Mr. C's learning goal.

Video Link

Taken from Inside Mathematics
(http://www.insidemathematics.org/classroom-videos/public-lessons/6th-grade-math-rates-lipman/lesson-part-2)

What are Mr. C's learning goals?

What do you notice about your learning goal statements for Mr. C's lesson compared to the learning goals you initially wrote?

Video Link

Taken from Inside Mathematics (http://www.insidemathematics.org/classroom-videos/public-lessons/6th-grade-math-rates-lipman/lesson-part-2)

Diagnose student understanding (Hiebert, Morris, & Spitzer, in press)..

Look for evidence of the learning goal in student work or verbal responses and then use this evidence to refine the learning goal (Hiebert, Morris, & Spitzer, in press)

Use curricular materials or draw on expertise from colleagues to refine the learning goal (Drake, Land, & Tyminski, 2014; Stein & Meikle, 2017)

Why are learning goals important?

Drive instruction (Stein & Meikle, 2017).

Selecting tasks

Selecting solution strategies to be shared

Constructing questions

Constructing assessments (informal or formal)

e.g., Students explore a high cognitive demand task. The teacher monitors students' work and purposefully selects strategies to be shared that have the greatest chance of promoting the learning goal(s).

Develop mathematical knowledge for teaching (Ball, Thames, & Phelps, 2008).

Connect goals across lessons

Sequence tasks

Predict students' solutions to tasks

Understand how students learn concepts over time (Stein & Meikle, 2017)

Diagnose student understanding (Hiebert, Morris, & Spitzer, in press)..

Modify future implementations of lessons

Modify subsequent instruction based on students' current understanding

Identify students' current understandings rather than just quantifying their performance

Using learning goals to facilitate whole-class discussions

Orange juice task - Solve the Task in as many ways as you can

Task taken from https://connectedmath.msu.edu/teacher-support/student-work/student-work-from-comparing-scaling-problem-1-2-making-juice/

Five practices for orchestrating class discussions (Stein, Engle, Smith, & Hughes, 2008; Stein & Smith, 2011)

0. Selecting a task and specifying a learning goal
1. Anticipating
2. Monitoring
3. Selecting
4. Sequencing
5. Connecting

Analyze solutions for evidence of the learning goal and decide which 4 you would select

Do not consider how you would sequence the solutions yet!

Task and solutions taken from https://connectedmath.msu.edu/teacher-support/student-work/student-work-from-comparing-scaling-problem-1-2-making-juice/

Sequence the selected solutions based on connections you want to make between them

Write your selecting and sequencing decisions on the poster.

Task and solutions taken from https://connectedmath.msu.edu/teacher-support/student-work/student-work-from-comparing-scaling-problem-1-2-making-juice/

Selecting, sequencing and connecting

Some solution strategies highlight the concepts underlying the learning goals better than others (Meikle, under review; see Peterson & Leatham, 2009)

Pre-service teachers sometimes select and sequence olution strategies for other reasons and then some of the concepts underlying the learning goal can be missed (Meikle, 2014; Meikle, 2016)

Connections between solution strategies can inform the sequence (Meikle, 2016)

Analysis-of-teaching skills (Hiebert, Morris, Berk, & Jansen, 2007)

Specify a learning goal

Collect evidence

Construct hypotheses

Make revisions

Refine the learning goal

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How would you refine the learning goal to the OJ task?