Investigating the Science Reading Apprenticeship Classroom: Opportunities to Consider Teacher Practice

Please take a moment to fill out the survey at your table

Surveys of Classroom Practices

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<thead>
<tr>
<th>Practice</th>
<th>a lot</th>
<th>a little</th>
<th>Not at all</th>
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<tbody>
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<td>Students work together to make sense of course readings</td>
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<td>Students work together to make sense of content</td>
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<td>Students feel comfortable acknowledging their confusions</td>
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<td>Students work together on comprehending content in class</td>
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<td>Students are expected to read extensively</td>
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<td>How students make sense of the text</td>
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Investigating the Science Reading Apprenticeship Classroom: Opportunities to Consider Teacher Practice

Strengthening Student Success Conference, October 10, 2019

Theresa Martin, Linda Zarzana, Lilit Haroyan
Workshop Objectives

1. Define the Reading Apprenticeship framework
2. Uncover the teacher’s role in learners’ metacognitive practice
3. Identify key opportunities to incorporate metacognition in the STEM classroom.
The Reading Apprenticeship Framework

A partnership of expertise between the teacher and students...

...drawing on what content area instructors know and do as skilled discipline-based readers and problem solvers and on students’ unique and often underestimated strengths.
Reading for Golden Lines

Starting on Page 4 of your packet

What Does a Reading Apprenticeship Classroom Look Like?

Teachers can use this snapshot of a Reading Apprenticeship classroom as a reflection tool, for lesson planning, and with colleagues for peer observations. It can also serve as a guide for administrators’ classroom walk-throughs. Three characteristics of a Reading Apprenticeship classroom are paramount: a focus on comprehension, a climate of collaboration, and an emphasis on student independence.

A Focus on Comprehension

- Reading Apprenticeship is embedded in subject area learning: students develop strategies, identify and use text features, build topic knowledge, and carry out discipline-based activities while reading course-related materials.

The work of comprehending reading materials takes place in the classroom; the teacher scaffolds the learning and serves as model and guide.

- work of comprehending is metacognitive; how readers make sense of text is as important as what sense they make of it.

A Climate of Collaboration

Members draw on each other’s knowledge, serving as resources to make sense of text.

- Students respect and value problem-solving processes: classroom norms support sharing knowledge and confusion, and working together to solve comprehension difficulties support collaboration and inquiry: students work independently, in groups, and as a class, depending on the task and the text.

Process of reading and learning; they actively inquire into text to describe reading processes and text features is evident in classroom materials on display.

Independence

Process of reading and learning; they actively inquire into text...
Locate the Math text that students will be grappling with in the case study.
Performing Row Operations on a Matrix

Now that we can write systems of equations in augmented matrix form, we will examine the various row operations that can be performed on a matrix, such as addition, multiplication by a constant, and interchanging rows. Performing row operations on a matrix is the method we use for solving a system of equations. In order to solve the system of equations, we want to convert the matrix to row-echelon form, in which there are ones down the main diagonal from the upper left corner to the lower right corner, and zeros in every position below the main diagonal as shown.

\[
\begin{bmatrix}
1 & a & b \\
0 & 1 & d \\
0 & 0 & 1 \\
\end{bmatrix}
\]

We use row operations corresponding to equation operations to obtain a new matrix that is row-equivalent to a simpler form. Here are the guidelines to obtaining row-echelon form.

1. In any nonzero row, the first nonzero number is a 1. It is called a leading 1.
2. Any all-zero rows are placed at the bottom of the matrix.
3. Any leading 1 is below and to the right of a previous leading 1.
4. Any column containing a leading 1 has zeros in all other positions in the column.

To solve a system of equations we can perform the following row operations to convert the coefficient matrix to row-echelon form and do back-substitution to find the solution.

1. Interchange rows. (Notation: \(R_i \leftrightarrow R_j\))
2. Multiply a row by a constant. (Notation: \(cR_i\))
3. Add the product of a row multiplied by a constant to another row. (Notation: \(R_i + cR_j\))

Each of the row operations corresponds to the operations we have already learned to solve systems of equations in three variables. With these operations, there are some key moves that will quickly achieve the goal of writing a matrix in row-echelon form. To obtain a matrix in row-echelon form for finding solutions, we use Gaussian elimination, a method that uses row operations to obtain a 1 as the first entry so that row 1 can be used to convert the remaining rows.
Capturing your Reading Process

Debrief

What did you notice about your or someone else’s reading? How did they make sense of the text?
Classroom Case Study
Math Class Context Piece, Page 7 of packet,
Focus on P.11 - 13

Reading Apprenticeship in College Math

Class: Precalculus, Spring Semester 2016, Pasadena City College, Pasadena, California
Teacher: Richard Astdelserin

Profile

College: Pasadena City College (PCC), located in California’s San Gabriel Valley, is ten miles from downtown Los Angeles and serves the greater Los Angeles area. Founded in 1924, PCC is one of the largest single-campus community colleges in the nation (enrolling over 30,000 students), and is one of the top 25 community colleges in the US in Latino enrollment.

According to a report compiled by the Institutional Effectiveness Office, PCC’s student population, which is 51.7% female and 48.3% male, identify as:

- 48.6% Hispanic
- 23.6% Asian or Pacific Islander
- 9.2% White
- 4.5% African American
- 0.13% Native American
- 9.6% Two or more
- 4.4% Unknown

For the 2013-14 academic year, PCC was awarded the distinction of conferring the most Associate Degrees for Transfer (ADT) of any other California Community College. This honor is representative of the college’s reputation for excellence in the state. At the same time, PCC struggles, like all 113 California community colleges, to see sizable numbers of students attain their stated educational goals and to close a persistent achievement gap.

Source: Office of Institutional Research
Math Classroom Case Study

As you watch, make notes on the evidence and interpretation notetaker

Viewing Prompts:

1’s: notice students’ disciplinary reading, thinking, and talking.

2’s: notice supports for students’, disciplinary reading, thinking, and talking.

3’s: notice teacher talk stems (What does the teacher say to support students’ reading, thinking, and talking?)
How did the videocase demonstrate the RA classroom?

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A Climate of Collaboration

- Class members draw on each other’s knowledge, serving as resources to make sense of text together.
- Class members respect and value problem-solving processes: classroom norms support risk taking, sharing knowledge and confusion, and working together to solve comprehension problems.
- Grouping arrangements support collaboration and inquiry: students work independently, in pairs, in small groups, and as a class, depending on the task and the text.
- A shared vocabulary to describe reading processes and text features is evident in classroom talk, materials in use, and materials on display.

An Emphasis on Student Independence

- Students are agents in the process of reading and learning: they actively inquire into text meaning, their own and others’ reading processes, the utility of particular reading strate-
Brainstorm some ideas for classroom inquiry routines with your course content. Think about content that requires some critical thinking or problem solving skill, a threshold concept perhaps.

What metacognitive routine(s) could support students’ shared learning and meaning making?
For more information

THANK YOU!