

Study: Choosing the Lesson

We used the following guidelines for choosing the lessons we studied. We chose lessons



- faculty would like to observe;
- that have implications beyond a semester;
- that reinforce concepts learned before and
- that can be taught in the middle of a semester, when student stress level is moderate

Reflect: What We Learned

- To attain mastery in math skills, students need multiple opportunities to relearn and practice new concepts.
- We need to ask clear, unambiguous questions that allow students to explore the concepts.
- To understand how students think, we have to
 - Provide opportunities for students to explain their solutions to each other and write their solutions in detail.
 - Pay attention to their math vocabulary
 - Ask questions that are challenging and unambiguous.
- The clock and the syllabus are constant dictators of how we teach a lesson.
- The environment of the class contributes to the success of the process. Students have to be prepared for the faculty visit. Observers have to be seated at the back of the room without interrupting the class. The room should be spacious enough for teachers to walk around and observe students work.
- To collaborate with other motivated faculty to plan, teach, observe, and reflect on a lesson is a rewarding experience. You learn that there is no one good way to teach a lesson for all students.

Lesson Study – A Professional Development Activity for Teachers

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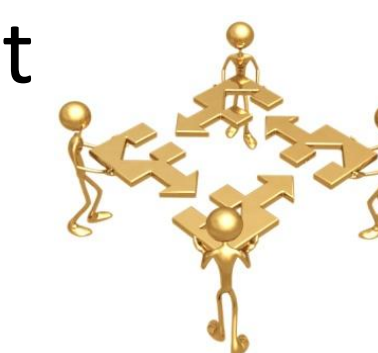
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Phase II Participants also includes : Gillian John, Thomas Kelley, and Jennifer Larose, HFCC

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Plan: What to Teach and Why

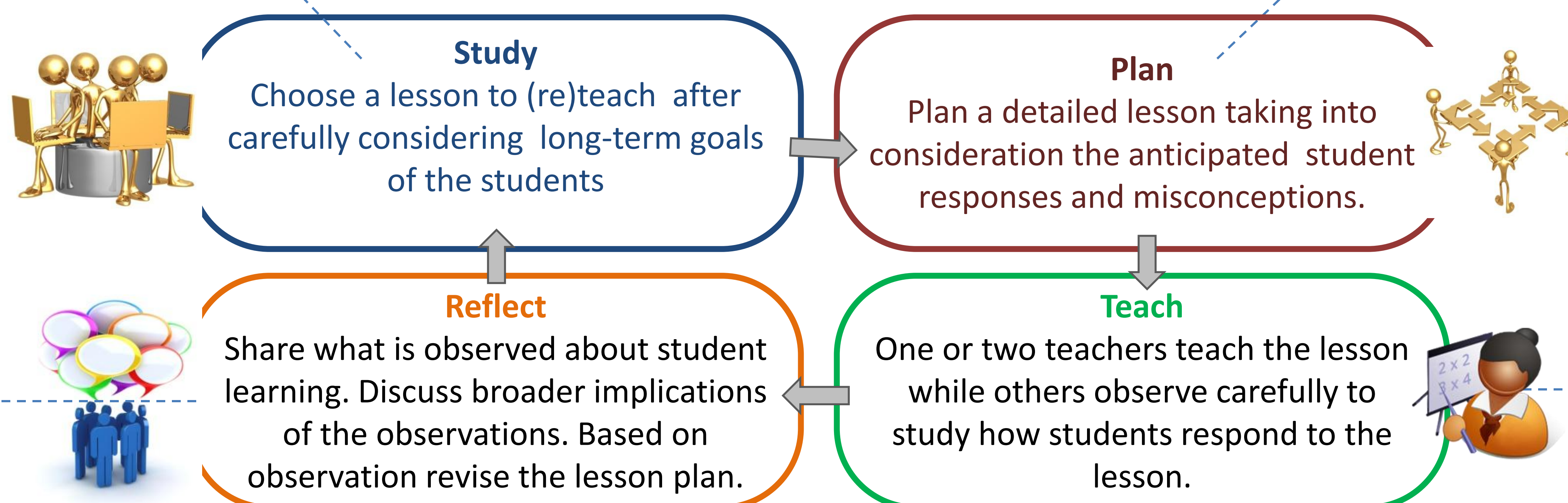
Planning a lesson is very educational. We learn from each other alternate ways to teach the material. We planned each lesson so that



- helps students learn concepts better;
- allows students to explore the content; and
- has enough formative assessments to allow faculty to observe students' thinking.

Abstract: This ACCESS project examines the use of Lesson Study as a professional development activity for community college teachers, through the experiences of math faculty in a Lesson Study group. The focus of Lesson Study is to improve instruction by collaborating with teachers to plan, teach, observe and reflect on teaching.

What Is Lesson Study? Lesson Study is a professional-development activity widely practiced by Japanese school teachers. In Lesson Study groups of teachers collaborate to study, plan, teach, and reflect on a research lesson. Based on their observations teachers make improvements to the lesson taught. This process also has a positive effect on other lessons taught by the teacher.

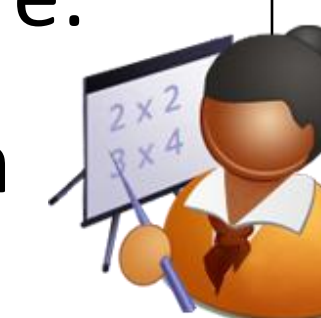


Lesson Study at Henry Ford Community College: Lesson Study was implemented in two phases. In Phase I (Winter 2010), four math faculty studied the lesson "Solving systems of linear equations in two variables". A math educator from the University of Michigan-Dearborn was our "knowledgeable other" who observed the lesson taught and participated in the "reflect" process. The lesson was modified based on our observations and taught again in Spring 2010. This modified lesson gave us more opportunities to observe students learning.

In Phase II (Fall 2010), seven faculty from the College are studying the lesson "Solving quadratic equations by the completing-the-square method."

Teach: What We Observed

The lesson prepared collaboratively is called a *research lesson*. One or two teachers taught the lesson, and others observed how the lesson was received by the students. Our observations are:



- Students engaged actively in learning when
 - they are placed in right groups;
 - we ask them unambiguous questions; and
 - we give them enough time to think.
- Students are willing to help each other learn.
- Several common and new misconceptions by students came up in the class discussions. This provided an opportunity to address issues and help students learn better.
- While teaching the research lesson, wide disparity in student mathematical maturity provided the added challenge of keeping the students focused on the goals of the lesson.
- Difficult to observe students at work, in a tightly packed class room.
- The placement of the observers in between students in the class room affects the behavior of the students. Students behavior was not affected when the observers were placed at the back of the classroom.

Participant Feedback

What do you like about Lesson Study?

"It is interesting to discuss a teaching topic in depth with a colleague. Provides a nice structure to the conversation about teaching."

What impact has the Lesson Study project had on you?

"Encourage asking more meaningful questions rather than procedural. Encouraged discussion with colleagues."

Would you recommend Lesson Study to a friend, and why?

"Our teaching and enjoyment of teaching improves when we engage in thoughtful reflection on how we present materials to our students."

Lesson-Specific Errors Observed in Student Work

Example 1: What is the solution to the following system of equations?

$$x + y = 3 \text{ \& } -x = y - 3$$

Answer: <The student rewrote both equations in the slope-intercept form to graph and realized the lines are same and answered>

Same line. Same slope, same y-intercept. All points are solutions.

Example 2a: What do you notice about the systems of equations that have no solutions?

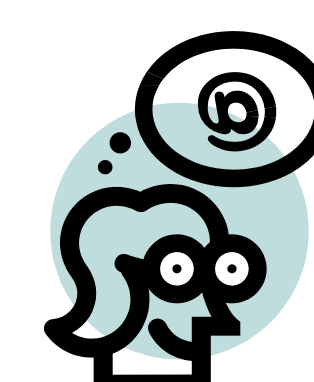
Answer: The two lines are parallel.

Example 2b: What do you notice about the systems of equations that have a unique solution?

Answer: The two lines are perpendicular.

Example 3: Solve the following equation using the square-root property: $2x^2 + 1 = 4$

Answer: $2x^2 + 1 = 4$
 $\frac{x^2 + 1}{2} = \frac{4}{2}$
 $x^2 = 1$
 $x = 1 \text{ or } x = -1$



Example 4: Solve the following equation using the square-root property: $(x-2)^2 + 1 = 10$

Answer: $(x-2)^2 + 1 = 10$
 $(x-2)^2 = 9$
 $x-2 = 3$
 $x = 5 \text{ or } x = -5$

Teacher: Why are $x=5$ and $x=-5$ solutions?

Student: When applying the square-root property the equation has both positive and negative numbers as solutions.



References

James G. Stigler & James Hiebert (1999), *The Teaching Gap*. The Free Press (a division of Simon and Schuster Inc.)

Catherine C. Lewis (2002), *Lesson Study: A Handbook of Teacher-Led Instructional Change*. Research for Better Schools Inc. (Lesson Study Cycle figure is developed based on a model from this textbook)

Acknowledgements

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