

Tutor Tips - Turn Your Math Lesson Plans Up-Side Down

Should you turn your Math lesson plans 'upside down'? Research suggests that it might be a good idea. This article reviews findings from a study of 231 eighth grade math lessons worldwide and their implications for lesson planning.

Researchers videotaped 8th grade mathematics classrooms in Japan, Germany, and the US as part of the Third International Mathematics and Science Study [TIMSS]. Each classroom teacher also completed a questionnaire that asked about lesson details, lesson organization and lesson goals, among other things. The differences in lesson organization are of particular interest in this article.

Teachers always structure lessons with their specific goals in mind. Many American teachers reported that their goal was to teach the student to complete a specific task. By contrast, the Japanese teachers defined their goal as being to help students understand a mathematical concept. The majority of US and German teachers focused on skills as the main thing to be learned, while Japanese teachers focused on thinking as the goal.

Teachers in Germany and the US use basically the same lesson organization. A lesson usually has the following parts:

1. **Demonstration.** First the teacher, or one or more students, demonstrates the skill for the class. The class follows along and takes notes.
2. **Guided practice.** The entire class 'walks' through the skill step-by-step along with the teacher. Students ask questions to clarify the steps.
3. **Practice.** Students perform the skill independently. The teacher observes and supports individuals in an effort to meet the needs of diverse students in the same classroom.
4. **Assessment.** Either formally or informally, the students are assessed on the extent to which the skill has been learned and can be completed. This assessment may indicate a need for reinforcement, or even for re-teaching the same skill in later lessons.

Japanese lessons rearrange these phases, nearly reversing them:

1. Students try to solve problems on their own. They are expected to draw on prior lessons and attempt to discern the method needed to arrive at the given answer. This might be called Pre-Practice.
2. Teacher-guided discussion. The students discuss their relative success with the problems and possible solution methods.
3. Repetition of steps 1 and 2. The process continues until the class as a whole works out the mathematical concepts and methods for solving the problems.

You can see that the difference in lesson design is necessary because of the difference in lesson goals in the short run. On the other hand, in the long run skill development can be expected to follow inevitably from concept understanding. Immediate assessment might, in the second lesson design, indicate that students were not mastering solution skills within the lesson. The timing of



assessments would need to be adjusted to allow for the longer cycle in the Japanese designed lessons.

The Japanese lesson design demands the attention and involvement of the students to a greater extent than does the more typical American lesson. Perhaps for this reason more than any other, it would be difficult to implement in an American classroom with its frequent interruptions and greater diversity among students.

By contrast, a tutor can make good use of the Japanese lesson design. In one-on-one or small-group teaching the confusions and interruptions are limited. A tutor also has the luxury of building a close rapport with each student that can help support a trial-error-discussion-trial effort that might be impractical in a more public setting.

The application of the two teaching designs in concert – classroom and tutor – can provide an ideal educational experience for the individual student.

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