

Key ideas for effective professional development: Purposeful classroom observation and non judgmental data collection

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Three Levels of Teaching

Japanese mathematics educators and teachers identify three levels of expertise of mathematics teaching:

- Level 1: The teacher can tell students the important basic ideas of mathematics such as facts, concepts, procedures, and practice.
- Level 2: The teacher can explain the meanings and reasons of the important basic ideas of mathematics in order for students to understand them.
- Level 3: The teacher can provide students with opportunities to understand these basic ideas, and support their learning so that the students become independent learners.

(Sugiyama, Y. 2008, Trans. Takahashi, A., 2011a)

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Some pupils are tempted to evade precisely that portion of the work which gives the benefit, by memorizing the results of the work of others. This temptation is great to some pupils, and perhaps no other subject can become so barren and dreary as mathematics so studied. **Memorizing.** Ten pages of mathematics *understood* are better than a hundred memorized and not understood, and one page actually worked out independently is better than ten pages clearly but passively understood. The question is not *how much?* but *how?* The object is mastery, attainment of the spirit of the subject, and not to train the memory, or to ingest a large bulk of mathematical fact and formulas.]

The teaching of Mathematics in the elementary and the secondary school
by J.W.A. Young, 1908, p.38

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Purpose of the mathematics classroom is to help Students
-Polya, how to solve it-

- The student should acquire as much experience of independent work as possible.
- The teacher should help, but not too much and not too little, so that student shall have reasonable share of the work.
- The teacher should leave him at least some illusion of independent work.
- The best is, however, to help the student naturally.
 - The teacher should put himself in the student's place, he should see the student's case, he should try to understand what is going on in the student's mind, and ask a question or indicate a step that could have occurred to the student himself.

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There are various ways in which teaching mathematics may be studied with profit :

How the teaching of Mathematics may be studied.

1. By reading the published results of the experience of others.
2. By personal consultation with experienced teachers.
3. By observation of teachers at work.
4. By actual teaching.

The best-arranged schemes of training in the art of teaching include considerable work under each of the four heads, which are arranged in order of increasing importance. Quite a little work should be done under the first three heads before the fourth and chief is taken up.

(J.W.A. Young, 1908, p.8)

Three major forms of professional development in Japan

- Lesson Study
- Observing demonstration lessons
- Lecture/Workshop

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Purposeful classroom observation and non judgmental data collection

Lesson Study

- Lesson Study is a form of teacher research, a search for a solution to a teaching-learning problem.
- Observers are responsible for collecting data on how the lesson impacts the students, relative to the research theme and the learning goals.
- A video recording of the lesson can be useful for some purposes, but Lesson Study requires observations from multiple viewpoints, so video does not substitute for live observation.

Demonstration lesson

- Demonstration lesson may be consider as a teacher presentation about ideas for improving teaching and learning using a live lesson with actual students.
- Observers are responsible for collecting data on how the lesson impacts the students.
- A video recording of the lesson may be useful for sharing the idea for improving teaching and learning.

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Demonstration Lesson by Mr. Hosomizu

- Nearly 40 years of teaching experience with the focus of elementary mathematics.
- As a teacher of a professional development school affiliated with a national university, he teaches demonstration lessons regularly in his school as well as visiting local schools throughout Japan.
- He also serves as knowledgeable others to provide final comments at research lessons held at local schools throughout Japan.

Demonstration Lesson by Mr. Hosomizu

Solving problems autonomously

I believe that the most effective way to nurture the ability to reason and express themselves is to make students like mathematics. In order to do so, we must develop lessons in which students can notice and taste the beauty and usefulness of mathematics as well as the joy of thinking. In this lesson, I want students to realize the amusement of changing subtractions with regrouping into subtractions without regrouping or making use of patterns in calculations. I propose a method in which students can develop their ability to calculate autonomously and with enjoyment instead of calculation drills.

(Quote from the lesson plan developed by Mr. Hosomizu in Japanese and translated by Tad Watanabe 2015)

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Lesson Observation

- non judgmental data collection -

- Observers are responsible for collecting data on how the lesson impacts the students, relative to the research theme and the learning goals.

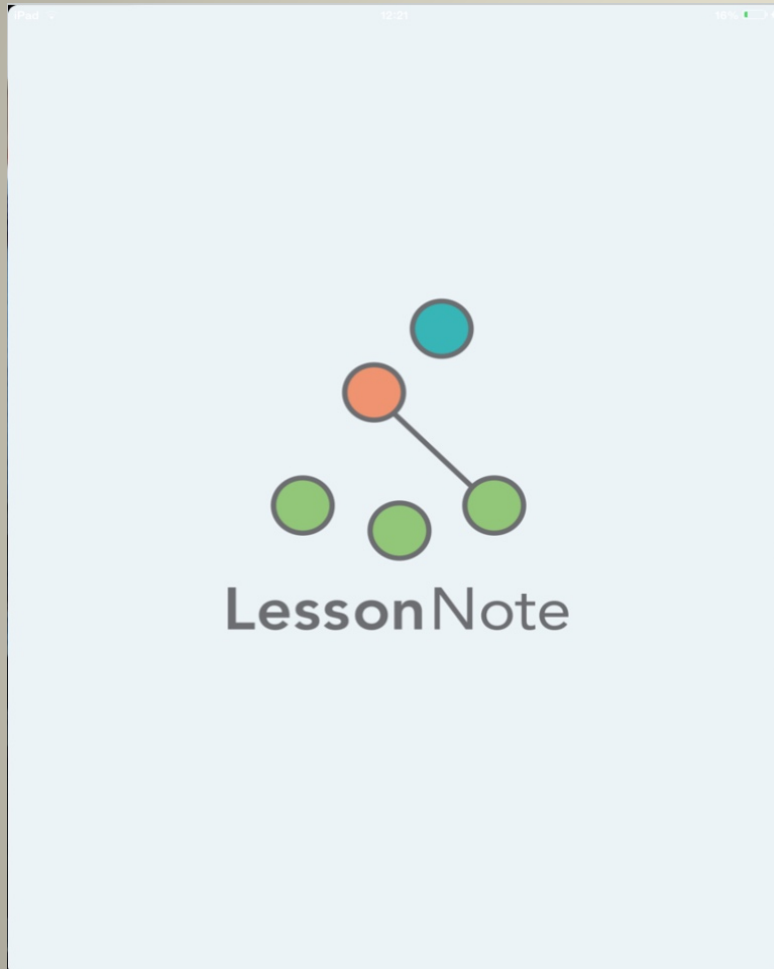
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LessonNote

<http://www.lessonnote.com>

The image shows the LessonNote app interface on an iPad. At the top, there's a status bar with "iPad", signal strength, and battery level. Below that, a navigation bar includes "戻る" (Back), "授業中" (Class in Progress), a timer "00:06:53", "学級全体" (Whole Class), and "座席表編集" (Edit Seating Chart). A "記録を編集" (Edit Record) button is on the left, and a "新規メモ" (New Memo) button is on the right. The main area displays a classroom seating chart with desks labeled D01 to D13 and student seats labeled S01 to S24. A teacher icon (T01) is at the top, and a line connects it to student S17. At the bottom, there's a red "記録タイマー停止" (Stop Recording Timer) button, a timer "00:01:50", and "T01 > S17". Below the app interface is a grid with a handwritten math problem: $\frac{4}{7} + \frac{5}{9}$ 何? (What?).

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To Review Notes after a Lesson Observation

Back Subtract 129-53

With Image Flagged Annotated Clear Filters

+ Add Transition

16:03 (+15:44) - T01 (56s)

We've written horizontal of vertically.
Now need to find how many left.

16:04 (+16:46) - Transition to group work

16:04 (+17:04) - Justin (16s)

(n.b $\begin{array}{r} 129 \\ -53 \\ \hline \end{array}$)

16:05 (+17:39) - Note (1:03)

Why note that way
Not supposed to put
I want
to 2 put under 29.

16:01 (+13:45) - Edwin - D01...
129 \checkmark 35 [sic]

16:01 (+13:56) - T01 (12s)
Anyone notice how
he works

16:01 (+14:09) - Anon (14s)
I'm easier.

16:02 (+14:23) - Mikalangelo...
He started under
the 29.

16:02 (+14:40) - Mikalangelo...
129
53
62

16:02 (+14:51) - T01 (8s)
Explain

16:02 (+14:57) - Mikalangelo...
16:03 (+15:29) - Miguel (14s)
16:03 (+15:44) - T01 (56s)

16:05 (+17:39) - Note (1:03)

16:06 (+18:46) - S07 (28s)

16:07 (+19:16) - Ramisha (5s)

START

END

Name	Count	Time
T01	48	0:14:37
Lilian	7	0:00:57
Miguel	7	0:00:53
Mikalangelo	7	0:03:04
Anon	6	0:00:49
D01	5	0:01:04
Alessandro	4	0:00:48
Christian	4	0:01:43
Ramisha	4	0:00:28
Aylin	3	0:00:42
Bryan	2	0:00:08
Elizabeth	2	0:00:27
Jabrael	2	0:01:00
Justin	2	0:00:21
Sara	2	0:00:37

Back Subtract 129-53

With Image Flagged Annotated Clear Filters

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START

END

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Resources on CLR

- Takahashi, A., & McDougal, T. (2016). Collaborative lesson research: maximizing the impact of lesson study. *ZDM*, 1-14. doi: 10.1007/s11858-015-0752-x