It All Fits Together

Notes on a Visit to Japan

Mark Saul

Japanese society can be a puzzle for the foreign visitor. But eventually the pieces all fit together.

In the summer of 2000, supported by the National Science Foundation, I spent two weeks talking and working with Japanese teachers and researchers in mathematics education. I attended the International Congress on Mathematical Education as well as a seminar for American and Japanese classroom teachers.

On the first morning of my visit, I went to catch a bus. Commuters pouring out of the nearby train station lined up for their rides. Using the universal gestures, I found my way to a small change booth. Fares were paid outside the bus to make loading faster.

After paying my fare, I discovered two lines. Which was mine? I tried to ask a fellow commuter. I pointed to the other line, then to my destination, and he nodded. I pointed to the line we were on, then to my destination, and he nodded. Did he understand my question? Or would I be whisked away to some obscure Tokyo suburb?

The puzzle was solved when the bus pulled up. It had two doors. To expedite loading, passengers formed two lines for the same bus. It all fits together.

I had analogous experiences with more serious professional matters as well. What we hear in America about the Japanese educational system sometimes seems strange, because we are seeing only one piece of the puzzle. Finding the other pieces can be difficult, because we must learn to ask just the right question.

For example, we often hear that Japanese teachers don't give homework. "That's right," said Hiroko Uchino, a colleague at the teachers' seminar. "Most of our students spend several hours a week at juku [the privately run after-school programs that supplement public education]. They get homework there, so we don't have to give homework in our classes. The juku homework is directly related to what the students are learning in the schools. If we did give homework, the students would do the juku homework first and ours only if they have time. So we leave homework to juku." It all fits together.

Uchino then filled in another part of the picture: "In the district where I teach now, there are not many juku. So in fact I do give homework."

"But can all students afford juku?" I asked Hiroshi Fujita, a mathematician involved in education. Fujita was instrumental in forming a team to represent Japan in the International Mathematical Olympiad and is active in the construction of national curricula.

He replied, "Happily, most can. And in families where money is short, Japanese parents will usually decide to spend it on education rather than on other items."

Hiroko Uchino explained a bit more: "For many students, juku is a social thing. They'll ask their parent, 'Mom, Kenzo goes to this cool juku on Makuhari Street. Can I go there with him?' Even if

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they wanted to, it would be hard for parents to say no."

Fujita contributed yet another piece. "We are in the process of cutting our curriculum now, by about 30 percent. The Ministry of Education has decided that students will not have school on Saturdays. Part of the decision process will involve examining whether topics will be covered by juku, even if we drop them from the official curriculum."

Fujita was referring to a recent decision by the Ministry of Education to phase out classes on Saturday for Japanese students. As the Ministry expresses it, the Japanese want to return to the children a "zest for life". The Japanese are very conscious that childhood is difficult in their society and that many children do well in mathematics but do not like the subject. I have heard this point dismissed by some American observers as being less important than academic achievement. The Japanese themselves seem to have a different view.

What will be cut? The process will be a very important one for Americans to watch. Will the Japanese cut out the part of their curriculum that encourages thinking and experimentation? Will they cut out computational skills? Or will they strike a balance? The results will tell us much about what the Japanese value in their own system.

Right now juku is an essential part of the balance in many schools. How is work at juku aligned with schoolwork? Masayuki Ishitani, a high school teacher, explained this piece. We had been talking about textbooks: about how much thinner the Japanese texts are than the American and how textbooks are supplied free to students in Japanese elementary and middle schools. "The publishers don't make money on the textbooks they publish. They get their revenue by publishing supplementary review books, three or four times thicker than the text. These contain problems on the topics covered by the text and sometimes additional explanation. Everyone buys these books. The publishers make their money, and the juku gets its instructional material."

Viewed from afar, the Japanese system of mathematics education sometimes seems simple. The teachers know the mathematics and train the students in the subject. Then the students take tests and succeed. There is no nonsense about "understanding", about students constructing their own knowledge, about critical thinking or the beauty and mystery of mathematics. If we simply attended directly to instruction and not to the students' "understanding", we would be able to duplicate the Japanese achievement.

This view is simple but wrong. The Japanese teachers I talked to set great value in student understanding. They eschewed direct instruction, preferring rather to have students learn through experience. The lessons I saw, mostly in elementary and middle school classes, used cooperative learning, group discussion, and hands-on experiences. Teacher intervention was minimal and subtle. In short, the lessons I saw were not very different from those described in the *Principles and Standards for School Mathematics* of the National Council of Teachers of Mathematics.

So what is the difference? How are the Japanese so remarkably successful where the Americans have significant problems? A historical view provides a piece of the answer.

When I commented about this to Akihiko Takahashi, he replied, "This has not always been the case. Direct instruction was quite common until the postwar years. Our view of education has changed completely in the last generation or two."

Curiouser and curioser. How could this formal, traditional society turn itself around so quickly? Especially in the field of education, which is notoriously conservative? It would seem that American society, which sets such a high value on growth, on initiative, on progress, would have much greater capacity to adopt new ideas than a society with millennia of highly formal traditions in education.

It was Gail Burrill, a noted American educator and director of the Mathematical Sciences Education Board, who gave me a clue. "Conservative? That's not how I think of Japan at all. I think of Deming's view." She was referring to the work of W. Edwards Deming, the American engineer and businessman who helped to revitalize Japanese industry after World War II. "The Japanese are highly skilled at looking around, at adapting what they see to their own needs. And not just adapting. They have a long tradition of seeking improvement in what they find. That is one key to their economic success, and it may also be a key to their success in education." Another piece of the puzzle began to fit into place.

Yet another piece bothered me, but it took an experience outside of education to help me organize my ideas. At lunch counters Japanese food often comes in "sets". For example, you can get a roll, soup, and coffee all for one price, or you can get a sandwich, coffee, and dessert all for one price.

But what if you want a sandwich, soup, and dessert?

Once you've made your wishes known to the sales clerk, she will pause, then talk to her colleague. Both will consult with their supervisor, and he may consult with his supervisor, in a process that will take 15 or 20 minutes. You have unwittingly created a personal crisis: the desire of the staff to please a guest or help a patron conflicts with their need for order and their urge to make the system work. You may or may not get the meal you want. But it is not likely that you will request something outside a "set" next time.

How does this play out in schools? What of the student who wants a sandwich and dessert, who doesn't fit well into the "set" system? American teachers and schools spend much time and effort addressing this question. The Japanese, however, had trouble even understanding what it meant. They described to me their work with physically or mentally challenged students. They talked a bit about remediation. But I had difficulty describing to them the all-too-common American student who has troubles at home that overflow into the classroom, whose lack of social skills prevents fruitful classroom interactions, whose self-image does not include success in school, or whose feelings about adults thwart a healthy student-teacher relationship. These classroom challenges were not at all familiar to my hosts.

The problem of students bringing emotional baggage to class is certainly not as prevalent in Japan as it is in the United States. The Japanese child learns to fit into its society just as the hungry tourist learns about sets of food. Sometimes the rules of Japanese culture seem oppressive to the outsider, destructive of the individual's need for self-definition and self-expression. But Japanese children may not experience this conformity as something imposed on them. Rather, they may feel it is a way of pleasing people around them, people whom they love and respect. Why rebel against one's own instincts to love and to please?

I needed to know more about this question than a brief visit could provide. So I turned to Dan Teague. He has been working for almost a decade with the Japanese, mostly in the area of classroom technology, and has seen many Japanese classrooms.

"The teachers term them the 'red-haired kids'. They sit in the back of the room and don't do much work. They seem to feel disenfranchised by the system, and they rebel. But their form of rebellion isn't the same as our students'. It's more like dyeing your hair red, things that we would consider to be pretty standard adolescent stuff. That's not the kind of thing kids are supposed to be doing in Japan. They don't take their studies seriously. They leave school and become laborers—just like in the U.S."

Jackie Hurd teaches elementary school in California and spent a year in Japan. She told me a bit more about this aspect of Japanese schools. "Japanese teachers sometimes do have to deal with disruptive students. For example, bullying in the middle and high schools is a serious issue. But when they are having problems with a student, they don't refer them to the principal or counselor. It is not unusual for a Japanese teacher to visit a home to talk to parents or to consult with a group of teachers. The student will quickly get the message that several adults are involved.

"Another factor that influences the amount of disruptive behavior is the amount of time Japanese schools devote to community-building activities. Japanese schools devote as many as thirty days each school year to grade-level or schoolwide events, such as sports days, that are intended to build a sense of inclusion. Kids who are borderline may be pulled in by these events. It becomes very conspicuous to be on the outside, so only a tiny number of them separate themselves with antisocial behavior."

Dan Teague described how the examination system contributes to the picture. "A lot of the Japanese system is exam driven. High school is important because it prepares you for the college entrance exams. So it's important to go to a good high school. And middle schools prepare you for the high school entrance exams. These exams are milestones on the path to college. So if you've gotten into a good high school but then decide that the college exams are not for you, you're sort of stuck. You dye your hair red and drop out.

"The schools recognize this but don't do much. These kids are not disruptive. They sit in class without working, but also without disturbing others. Our problem is that when kids buy out of the system, they take others down with them. But in Japan you buy out on your own."

Teague continued, "College is interesting. The engineering schools, the medical schools, are serious places. But many of the other programs are less demanding. The philosophy is that graduates will be hired by big corporations, who will train them in their own subculture. Not everything has to be done in preservice education. Part of this is true for teachers as well. While their preservice training is serious, it is mostly about content. Pedagogical skills are carefully honed once the teacher has started work in the field."

Teague's words rang in my ears as I learned more about my colleagues' lives. Perhaps the most interesting part of the Japanese puzzle, and the one that may turn out to be critical to our understanding, is the practice of "lesson study". This collective examination of classroom practice has been well described in *The Teaching Gap*, by James W. Stigler and James Hiebert (Free Press, 1999). Briefly, Japanese teachers meet several times a year to observe a colleague's teaching. They then meet to discuss the lesson, how it went, and how it might be improved. Often, the lesson is taught again, with another round of inquiry. This practice is central to the work of the Japanese teacher: good lesson ideas are polished and published, and professional teacher organizations sponsor conferences built around lesson study.

When I first heard of this, I could not imagine how a teacher could submit to such a practice. Teaching is very personal, isn't it? The lesson plans I write—when I write them—are documents

intended for my supervisors, whose purpose is to hold me accountable for my work. How could a teacher possibly submit to a system where his practice and his accountability are held up to public scrutiny? It seemed to me at first something like the self-criticism sessions of Mao's Red Guard.

Rocky Von Eye, another American teacher, once told me about her visit to Japan. She was invited to a family dinner in a restaurant at which a fish, still alive, was brought to the table and cut up for sushi while its heart beat and its spine wriggled. Rocky worked hard to find a way to express her horror.

Finally, she asked her hosts delicately, "How does the fish feel?"

"Oh," they replied, "the fish is very happy. Look how many people it is feeding." Was this how Japanese teachers feel, giving so much of themselves to their colleagues?

This part of the puzzle filled in slowly. It became clear, through conversation and observation, that my fears were those of an outsider. Japanese teachers are trained with the expectation that they will engage in lesson study. They see other teachers working on it. They think of it partly as an opportunity to share what they know and can do or to talk about what they feel they need. The conversations I heard were in no way adversarial. Criticism was softened with praise and delivered with empathy. And this was all done in a natural fashion, without calling into question ego or professional pride. In Japan the culture of teaching has developed in a different direction from its path in America.

One reason that teaching is so private and such a source of pride in our country is that there are few other sources of pride for teachers. We don't have many rewards for good teaching. You close your door, you love your students, you enjoy your success. And you try to minimize intervention, for intervention is usually threatening. Your supervisor may need to feel knowledgeable as well and want to give suggestions for improvement, not rewards for success. Likewise, a researcher may want to look for ways to improve your instruction, not to learn from it. Even your colleagues may be looking competitively, to see what they are doing better, rather than cooperatively, to see what knowledge can be shared. We often think of teachers, not as sources of knowledge about instruction, but as agents putting to use the knowledge collected by others. Japanese teachers see themselves differently: as researchers and agents for change, roles which are largely denied American teachers. Lesson study is one way in which Japanese teachers enact these roles.

A Japanese lesson plan is quite a different document from an American lesson plan. The latter serves the novice teacher as an organizing device. But after a few years of teaching, other tools structure the day more efficiently. Planning for instruction takes place more and more in one's mind, with notes or diaries substituting for the formal lesson plan.

Except when it comes to one's supervisors. In America the experienced teacher sometimes sees the writing of a lesson plan as paperwork, a form of punishment by the bureaucracy for knowing too much. One's organizational prowess must be proved by committing it to paper.

I asked about this at a public seminar. The question was embarrassing to some of the American participants. Who is this tough teacher who doesn't think he needs to plan? Why is he objecting to a practice that we want to use to improve instruction in America? But I persisted: What's in it for the experienced teacher?

The Japanese had two answers to this question. One answer came quickly: No matter how good one is at one's job, there is room to improve. "Certainly," I thought, "but is writing down what you know an efficient tool for improvement?" This facile answer did not seem satisfying and probably was provoked by a misunderstanding of the cultural background to my question.

As often happened in Japan, I had to watch the process unfold to get a deeper answer. We were invited to a conference on lesson study. A group of teachers decided years ago to organize this conference annually during summer vacation. The event has become quite popular, with teachers traveling long distances to attend.

Kozo Tsubota, a master elementary school teacher, gave a lesson on stage to a group of students assembled for the purpose. The lesson was a work of art. The class had been working with pentominoes (figures made out of five unit squares). Tsubota asked them whether they could cover certain shapes (also built out of unit squares) with pentominoes. The lesson built towards an understanding that a necessary condition for the existence of such a covering was that the number of squares forming the shape was a multiple of 5. But of course this brief paragraph does not capture the magic of the lesson.

We had been warned before the conference that the discussion of the lessons here would include much more criticism than usual. I was interested in what criticisms Tsubota would receive. Would his colleagues find some deep flaw in the lesson? Or would they pick at nits to fulfill their role as friendly critic?

Neither turned out to be the case. There was some interesting discussion about the mechanics of the lesson. There was some more discussion about whether the students really understood that the condition of divisibility by 5 was not sufficient, only necessary. But mostly there was discussion about how this lesson fit into the curriculum, where it might lead, and how the

wonderful discussions and explorations generated could be harnessed in other contexts.

What I was seeing was not the submission to collective authority of a once-proud teacher. Rather, it was a process honoring his work and his knowledge and putting it at the service of other teachers, including novices struggling to find their feet, more experienced teachers looking for ideas to adapt, and master teachers seeking to broaden their expertise. We have few such processes in the United States, and I found myself wanting to make this one work for us. The very grounds on which I had initially rejected lesson study turned out to be the attractions it held for me.

One more piece fit together the next evening. In outlining the process of lesson study, the Japanese always included, as a final step, a "party". Many of us found this amusing. Of course it's important to build informal relationships with coworkers. Teachers relax over lunch, complain at the copying machine, and even go out for a drink after work. But why list this as part of the process? We found out that evening.

Japanese meetings are businesslike. There is less of the jocularity that softens work relationships in American meetings. Discussion is confined to the meaningful and doesn't seem to acknowledge personal relationships. Can the Japanese play out their professional roles without these personal relationships?

Of course not, and we discovered this piece of the puzzle at an evening *enkai*, the Japanese term for an office party. We sat, in the Japanese manner, on tatami mats. The beer and sake flowed, tasty Japanese dishes were passed around, and the discussion was anything but formal. Our colleagues, who appeared so businesslike and efficient earlier in the day, proved to be warm and sensitive individuals, communicating with earthy humor and ebullient spirits their hopes for further work, their enjoyment of our encounter, and their search for a more direct, even emotional, understanding of each other to form the basis for our relationships.

Eizo Nagasaki, a researcher at the National Institute for Educational Research, found words to describe this experience. "We have been joking about the party as the last step in lesson study, but in fact it is more than a joke. Lesson study involves criticism, which can be difficult to hear. The teacher whose lesson is being studied has contributed significant effort and deserves a chance to relax and enjoy himself. So do the other participants. The party is a way of saying to the teacher, 'We value you. We appreciate your efforts. Even our criticism is directed to your work and not to you as a person. No matter what has come out of the lesson study, we accept and celebrate who you are.'" This attitude is something we could well learn from in American education. We celebrate our students' achievement much more than our teachers'.

A traveler to the Far East finds that part of the price of the trip is exacted in time: the journey home is very long. Yet there is a silver lining to this cloud. The long trip provides time for introspection, for putting together what one has learned.

As I flew over the stormy North Pacific, I reflected that perhaps the deepest lesson we can learn from Japan is about the very nature of our educational system. Their system is a tight mechanism whose pieces articulate with one another. And ours? We have 15,000 school districts, 50 states, numerous government and private organizations, all sharing responsibility for delivering and improving instruction. We are just waking up to the fact that this all forms a system, one that has grown up more or less without our conscious attention. It is not surprising that the system lies in pieces. Our next task is to fit the pieces together.