CHAPTER 6

Teaching Is a Cultural Activity

FOR MANY PEOPLE, family dinners are everyday events. They participate in these events without realizing all the aspects that are taken for granted. Everyone comes to the table and begins eating at about the same time. Menus are not distributed. Instead, the food is brought to the table in serving dishes and everyone eats the same things. The food is then parceled out by passing the serving dishes around the table, with everyone dishing up his or her own portion. Adults often help children with this task. Conversation usually is open, with no set agenda. Comments from everyone are welcome, with children and adults participating as conversational partners.

Family dinner is a *cultural* activity. Cultural activities are represented in cultural scripts, generalized knowledge about an event that resides in the heads of participants. These scripts guide behavior and also tell participants what to expect. Within a culture, these scripts are widely shared, and therefore they are hard to see. Family dinner is such a familiar activity that it

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sounds strange to point out all its customary features. We rarely think about how it might be different from what it is. On the other hand, we certainly would notice if a feature were violated; we'd be surprised, for example, to be offered a menu at a family dinner, or to be presented with a check at the end of the meal.

Cultural scripts are learned implicitly, through observation and participation, and not by deliberate study. This differentiates cultural activities from other activities. Take, for example, the activity of learning to use a computer. For older Americans, learning to use the computer is usually not a cultural activity. We learned to use the computer by consciously working on our skills—by reading manuals, taking notes, getting help from experts, and practicing. Using computers is an interesting example because it is rapidly becoming a cultural activity. Children, for example, learn naturally, by hanging around their older siblings. But there still are those for whom it has the distinctly noncultural traits of intentionally, deliberately, and self-consciously working through the activity.

Teaching, in our view, is a cultural activity.[1] It is more like participating in family dinners than like learning to use the computer. This might be surprising, because teaching is rarely thought of in this way. As we noted earlier, some people think that teaching is an innate skill, something you are born with. Others think that teachers learn to teach by enrolling in college teacher-training programs. We believe that neither is the best description. Teaching, like other cultural activities, is learned through informal participation over long periods of time. It is something one learns to do more by growing up in a culture than by studying it formally.

Although most people have not studied to be teachers, most people have been students. People within a culture share a mental picture of what teaching is like. We call this mental

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picture a *script*. The script is, in fact, a mental version of the teaching patterns we identified in Chapter 5. The difference is that the patterns were observable in the videotapes; scripts are mental models of these patterns. We believe that the scripts provide an explanation for why the lessons within a country followed distinctive patterns: the lessons were designed and taught by teachers who share the same scripts.

It is not hard to see where the scripts come from or why they are widely shared. A cultural script for teaching begins forming early, sometimes even before children get to school. Playing school is a favorite preschool game. As children move through twelve years and more of school, they form scripts for teaching. All of us probably could enter a classroom tomorrow and act like a teacher, because we all share this cultural script. In fact, one of the reasons classrooms run as smoothly as they do is that students and teachers have the same script in their heads: they know what to expect and what roles to play.

Implications of Teaching as a Cultural Activity

We have already made the point that teaching is a complex system, and we have pointed out some implications of this fact. To say that teaching is a cultural activity reveals an additional truth about teaching: Cultural activities, such as teaching, are not invented full-blown but rather evolve over long periods of time in ways that are consistent with the stable web of beliefs and assumptions that are part of the culture. The scripts for teaching in each country appear to rest on a relatively small and tacit set of core beliefs about the nature of the subject, about how students learn, and about the role that a teacher should play in the classroom.[2] These beliefs, often implicit, serve to maintain the stability

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of cultural systems over time. Just as we have pointed out that features of teaching need to be understood in terms of the underlying systems in which they are embedded, so, too, these systems of teaching, because they are cultural, must be understood in relation to the cultural beliefs and assumptions that surround them.

Let's return to the example of the chalkboard versus the overhead projector. Recall that many teachers in the United States have replaced the chalkboard with the overhead projector, whereas Japanese teachers have not. In Chapter 5 we explained this difference in terms of the different instructional systems in which the visual aids are used. In U.S. classrooms visual aids function to guide and control students' attention. Seen in this light, the overhead projector is preferred because it gives teachers even more control over what students are attending to. Within the Japanese system of teaching, visual aids serve a different function. They are not used to control attention but to provide a cumulative record of the lesson's activities and their results. Japanese teachers do not use the overhead projector because it is not possible to fit the cumulative record on an overhead transparency.

To dig deeper we must ask why Japanese teachers want a cumulative record of the lesson to be available to students and why U.S. teachers want to control students' attention. To answer these questions we need to situate these two systems of teaching in the context of cultural beliefs about how students learn and about the role the teacher can play in this process.

Cultural Beliefs About Teaching and Learning: Japan and the United States

As we pursue deeper comparisons of teaching, we focus on Japan and the United States because this comparison is the most

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dramatic, and therefore illustrates well the role that beliefs can play in generating and maintaining cultural scripts for teaching.

Nature of Mathematics

The typical U.S. lesson is consistent with the belief that school mathematics is a set of procedures. Although teachers might understand that other things must be added to these procedures to get the complete definition of mathematics, many *behave* as if mathematics is a subject whose use for students, in the end, is as a set of procedures for solving problems.

In our study, teachers were asked what "main thing" they wanted students to learn from the lesson. Sixty-one percent of U.S. teachers described *skills* they wanted their students to learn. They wanted the students to be able to perform a procedure, solve a particular kind of problem, and so on.

Many U.S. teachers also seem to believe that learning terms and practicing skills is not very exciting. We have watched them trying to jazz up the lesson and increase students' interest in nonmathematical ways: by being entertaining, by interrupting the lesson to talk about other things (last night's local rock concert, for example), or by setting the mathematics problem in a real-life or intriguing context—for example, measuring the circumference of a basketball. Teachers act as if student interest will be generated only by diversions outside of mathematics.

Japanese lessons appear to be generated by different beliefs about the subject. Teachers act as if mathematics is a set of relationships between concepts, facts, and procedures. These relationships are revealed by developing solution methods to problems, studying the methods, working toward increasingly efficient methods, and talking explicitly about the relationships of interest.

On the same questionnaire, 73 percent of Japanese teachers

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said that the main thing they wanted their students to learn from the lesson was to think about things in a new way, such as to see new relationships between mathematical ideas.

Japanese teachers also act as if mathematics is inherently interesting and students will be interested in exploring it by developing new methods for solving problems. They seem less concerned about motivating the topics in nonmathematical ways.

Nature of Learning

If one believes that mathematics is mostly a set of procedures and the goal is to help students become proficient executors of the procedures, as many U.S. teachers seem to, then it would be understandable to believe that mathematics is learned best by mastering the material incrementally, piece by piece. This view of skill learning has a long history in the United States.[3] Learning procedures occurs by practicing them many times, with later exercises being slightly more difficult than earlier ones. Practice should be relatively error-free, with high levels of success at each point. Confusion and frustration, in this traditional American view, should be minimized; they are signs that earlier material was not mastered. The more exercises, the more smoothly learning will proceed.

Suppose students are studying how to add and subtract fractions with unlike denominators, such as $\frac{2}{3} + \frac{4}{7}$. The U.S. beliefs about learning described above would dictate that students should first master adding fractions with like denominators, such as $\frac{1}{5} + \frac{2}{5}$, then be shown how to add simple fractions with unlike denominators, such as $\frac{1}{2} + \frac{1}{4}$, being warned about the common error of adding the denominators (to minimize this error), and later practice more difficult problems, such as $\frac{2}{3} + \frac{4}{7}$.

Japanese teachers appear to hold a different set of beliefs

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about learning and probably would plan a different kind of lesson for adding fractions. One can infer that Japanese teachers believe students learn best by first struggling to solve mathematics problems, then participating in discussions about how to solve them, and then hearing about the pros and cons of different methods and the relationships between them. Frustration and confusion are taken to be a natural part of the process, because each person must struggle with a situation or problem first in order to make sense of the information he or she hears later. Constructing connections between methods and problems is thought to require time to explore and invent, to make mistakes, to reflect, and to receive the needed information at an appropriate time.[4]

What kind of lesson on adding and subtracting fractions with unlike denominators would these beliefs generate? A teacher's manual in a popular Japanese textbook series gives us a clue.[5] It alerts teachers that the error students are most likely to make is to add the denominators. Students will learn to understand the process more fully, says the manual, if they are allowed to make this mistake and then examine the consequences. Some suggestions are given for how to help students reflect on the inconsistencies they will encounter if they add, for example, ½ and ¼, and get ⅔. Teachers are to begin the lesson with a problem like this and then compare the different methods for solution that students develop. Obviously, struggling and making mistakes and then seeing why they are mistakes are believed to be essential parts of the learning process in Japan.

Role of the Teacher

Given the differences between the United States and Japan in the apparent beliefs about the subject and learning, it is not surprising that marked differences can be inferred regarding beliefs

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about the role of the teacher. U.S. teachers appear to feel responsible for shaping the task into pieces that are manageable for most students, providing all the information needed to complete the task and assigning plenty of practice. Providing sufficient information means, in many cases, demonstrating how to complete a task just like those assigned for practice. Teachers act as if confusion and frustration are signs that they have not done their job. When they notice confusion, they quickly assist students by providing whatever information it takes to get the students back on track.

We saw the following sequence of events over and over. Teachers assign students seatwork problems and circulate around the room, tutoring and monitoring students' progress. Several students ask, in quick succession, about the same problem. Teachers interrupt the class and say, for example, "Number twenty-three may be a little confusing. Remember to put all the x-terms on one side of the equation and all the y-terms on the other, and then solve for y. That should give the answer." In Mr. Jones's lesson (presented in Chapter 3), these problems were numbers 37 and 38, and as soon as he sensed that the students had reached them during their seatwork and were struggling, he stepped in to show the solutions. Teachers in the United States try hard to reduce confusion by presenting full information about how to solve problems.

U.S. teachers also take responsibility for keeping students engaged and attending. Given their beliefs about the nature of mathematics and how it is learned, moment-by-moment attention is crucial. If students are watching the teacher demonstrate a procedure, they need to attend to each step. If their attention wanders, they will be lost when they try to execute the procedure on their own. Now we have a deeper explanation for the frequent use of the overhead projector by U.S.

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teachers. The projector's capability of focusing attention fits well with the teachers' beliefs about teaching mathematics.

In addition to the use of overhead projectors, U.S. teachers use a variety of other techniques to hold students' attention. They pump up students' interest by increasing the pace of the activities, by praising students for their work and behavior, by the cuteness or real-lifeness of tasks, and by their own power of persuasion through their enthusiasm, humor, and "coolness."

Japanese teachers apparently believe they are responsible for different aspects of classroom activity. They often choose a challenging problem to begin the lesson, and they help students understand and represent the problem so they can begin working on a solution. While students are working, the teachers monitor their solution methods so they can organize the follow-up discussion when students share solutions. They also encourage students to keep struggling in the face of difficulty, sometimes offering hints to support students' progress. Rarely would teachers show students how to solve the problem midway through the lesson.

Japanese teachers lead class discussions, asking questions about the solution methods presented, pointing out important features of students' methods, and presenting methods themselves. Because they seem to believe that learning mathematics means constructing relationships between facts, procedures, and ideas, they try to create a visual record of these different methods as the lesson proceeds. Apparently, it is not as important for students to attend at each moment of the lesson as it is for them to be able to go back and think again about earlier events, and to see connections between the different parts of the lesson. Now we understand why Japanese teachers prefer the chalkboard to the overhead projector. Indeed, now we see, in a deeper way, why they cannot use the projector.

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Individual Differences

As a consequence of their implicit beliefs about the subject, learning, and the teacher's role, all teachers appear to hold a set of beliefs about individual differences among students. Many U.S. teachers believe that individual differences are an obstacle to effective teaching.[6] Meeting each student's needs means, ideally, diagnosing each student's level of performance and providing different instruction for different levels. This is not easy to do in a large class. As the range of differences increases, the difficulties of teaching increase. In simple terms, this is an obvious reason for tracking students into separate classes by ability or past performance. It is also the reason for reform efforts directed toward reducing class size. This belief says that the tutoring situation is best, academically, because instruction can be tailored specifically for each student or small group of students.

Japanese teachers view individual differences as a natural characteristic of a *group*. They view differences in the mathematics class as a resource for both students and teachers.[7] Individual differences are beneficial for the class because they produce a range of ideas and solution methods that provide the material for students' discussion and reflection. The variety of alternative methods allows students to compare them and construct connections among them. It is believed that all students benefit from the variety of ideas generated by their peers. In addition, tailoring instruction to specific students is seen as unfairly limiting and as prejudging what students are capable of learning; all students should have the opportunity to learn the same material.

For the Japanese teacher, the differences within a group are beneficial because they allow a teacher to plan a lesson more completely. Japanese teachers plan lessons by using the infor-

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mation that they and other teachers have previously recorded about students' likely responses to particular problems and questions. If the group is sufficiently large, they can be quite sure that these same responses will be given by these students. They can then plan the nature of the discussion that is likely to occur. The range of responses also provides the vehicle teachers use to meet the needs of different students. It is expected that different students will understand different methods and will think about the material at different levels of sophistication. Not all students will be prepared to learn the same things from each lesson, and the different methods that are shared allow each student to learn some things.

Sanctity of the Lesson

Another set of beliefs pertains to the significance of the classroom lesson. Lessons, of course, are the most common form of teaching. Classroom teaching, as it is known around the world, plays out through daily lessons. Students' lives in most schools are organized around the series of 45- to 60-minute periods that they move through in the course of a day. But different beliefs about teaching lead to treating lessons in quite different ways.

In Japan, classroom lessons hold a privileged place in the activities of the school. It would be exaggerating only a little to say they are sacred. They are treated much as we treat lectures in university courses or religious services in church. A great deal of attention is given to their development.[8] They are planned as complete experiences—as stories with a beginning, a middle, and an end. Their meaning is found in the connections between the parts. If you stay for only the beginning, or leave before the end, you miss the point. If lessons like this are going to succeed;

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they must be coherent. The pieces must relate to one another in clear ways. And they must flow along, free from interruptions and unrelated activities. It is clear why Japanese lessons we videotaped were never interrupted from the outside, not by P.A. announcements, not by lunch-count monitors, not by anyone.

It is quite easy to see how Japanese beliefs about mathematics, learning, and the role of the teacher lead to treating lessons in this way. In this belief system, mathematics is made up of relationships between ideas, facts, and procedures. To understand these relationships, students must analyze mathematical problems and different methods that can be used to solve them. They must struggle with problems first in order to make sense of later discussions about how to solve them and to understand the summary comments made by the teacher. So the lesson must tell a tightly connected, coherent story; the teacher must build a visible record of the pieces as they unfold so connections can be drawn between them; and the lesson cannot be sidetracked or broken by interruptions.

In the United States, lessons are treated differently. This is not surprising given the different beliefs about mathematics, learning, and the teacher. The activities within a lesson are more modular, with fewer connections between them. Practice time might be devoted to the procedures demonstrated on the current day, on the previous day, or during the previous week. Because learning procedures is believed to depend largely on practicing them, temporary interruptions, like outside intrusions or unrelated activities, do not ruin the lesson. They might be annoying, but they just reduce the number of practice exercises for that day. It might not be surprising, then, that we found that almost one-third of the U.S. lessons were interrupted in some way.

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Changing Cultural Activities

Cultural activities are highly stable over time, and they are not easily changed. This is true for two reasons. First, cultural activities are systems, and systems—especially complex ones, such as teaching—can be very difficult to change. The second reason is that cultural activities are embedded in a wider culture, often in ways not readily apparent to members of the culture. If we want to improve teaching, both its systemic and its cultural aspects must be recognized and addressed.

Teaching systems, like other complex systems, are composed of elements that interact and reinforce one another; the whole is greater than the sum of the parts. An immediate implication of this fact is that it will be difficult, if not impossible, to improve teaching by changing individual elements or features. In a system, all the features reinforce each other. If one feature is changed, the system will rush to "repair the damage," perhaps by modifying the new feature so it functions the way the old one did. If all teachers in the United States started using the chalkboard rather than the overhead projector, teaching would not change much. The chalkboard simply would be used to fill the visual-aids slot in their system and therefore would be used just as the overhead projector was—to catch and hold students' attention.

This point is missed in many popular attempts to reform teaching in the United States. These reforms start with indicators, like the ones we presented in Chapter 4, and try to improve teaching by influencing the level of the indicator. For example, having found that Japanese and German students encounter more advanced mathematics, reformers might propose that we present more challenging content in our schools. Or because

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Japanese teachers switch back and forth between classwork and seatwork more often than American teachers do, they might propose lessons with shorter classwork and seatwork segments. German and Japanese students do proofs, so perhaps we should include proofs in our lessons. Educational reforms in this country often have been driven by an effort to change our performance on quantifiable indicators like these.[9]

But because teaching is a complex system, these attempts to change it generally don't work. It has now been documented in several studies that teachers asked to change features of their teaching often modify the features to fit within their pre-existing system instead of changing the system itself. The system assimilates individual changes and swallows them up. Thus, although surface features appear to change, the fundamental nature of the instruction does not. When this happens, anticipated improvements in student learning fail to materialize and everyone wonders why.[10]

A well-known example comes from the New Math reforms of the 1960s. A major thrust of these reforms was changing the textbooks.[11] Because most mathematics teachers rely quite heavily on the textbook,[12] one might think that changing the textbook would change teaching. In 1975, after the changes had had time to take effect, the National Advisory Committee on Mathematical Education commissioned a study of school mathematics instruction. The study concluded that in elementary schools, "Teachers are essentially teaching the same way they were taught in school. Almost none of the concepts, methods, or big ideas of modern mathematics have appeared."[13] Even textbooks can get swamped by the system.

A more recent and personal illustration of the stability of systems of teaching occurred when one of us was working with a group of American teachers studying videotapes of Japanese

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mathematics instruction. After viewing the Japanese lessons, a fourth-grade teacher decided to shift from his traditional approach to a more problem-solving approach such as we had seen on the videotapes. Instead of asking short-answer questions as he regularly did, he began his next lesson by presenting a problem and asking students to spend ten minutes working on a solution. Although the teacher changed his behavior to correspond with the actions of the teacher in the videotape, the students, not having seen the video or reflected upon their own participation, failed to respond as the students on the tape did. They played their traditional roles. They waited to be shown how to solve the problem. The lesson did not succeed. The students are part of the system.

Systems of teaching are much more than the things the teacher does. They include the physical setting of the classroom; the goals of the teacher; the materials, including textbooks and district or state objectives; the roles played by the students; the way the school day is scheduled; and other factors that influence how teachers teach. Changing any one of these individual features is unlikely to have the intended effect.

Trying to improve teaching by changing individual features usually makes little difference, positive or negative. But it can backfire and leave things worse than before.[14] When one or two features are changed, and the system tries to run as before, it can operate in a disabled state. Geoffrey Saxe and his colleagues at UCLA found that when elementary school teachers were asked to teach fractions by implementing an innovative curriculum, some did so with higher student achievement than a comparison traditional program and some did so with lower student achievement.[15] The difference was that the successful teachers were provided with information and assistance by the project staff that, in our words, helped them improve their *system*. The less-successful teachers did not receive such assis-

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tance and tried to operate their conventional system with the new curriculum. This was not a good fit and did not promote students' learning. The point here is that trying to improve by changing individual features is not just ineffective; it is downright risky.

Bombarding teachers with waves of ineffective reforms can have another downside: Teachers can grow weary. They are asked over and over to change the way they do *x*, *y*, or *z*. Even when they try to accommodate the reformers and adopt a new feature or two, nothing much happens. They do not notice much improvement in students' learning. Although it might feel to teachers that they are changing, the basic system is running essentially as it did before. Always changing, and yet staying the same, is a discouraging state of affairs. It can lead to a defeatist kind of cynicism. "Not another reform," says the veteran teacher; "I'll just wait this one out." Quick fixes that focus on changing individual features leave behind a skeptical teaching corps.

The fact that teaching is cultural only further complicates and impedes efforts to change it. The widely shared cultural beliefs and expectations that underlie teaching are so fully integrated into teachers' worldviews that they fail to see them as mutable. The more widely shared a belief is, the less likely it is to be questioned—or even noticed. This tends to naturalize the most common aspects of teaching to the point that teachers fail to see alternatives to what they are doing in the classroom, thinking, "This is just the way things are." Even if someone wanted to change, things that seem this natural are perceived as unchangeable. It is no wonder that the way we teach has not changed much for many years.

Is it impossible to change? We don't think so. But we must be sure that our efforts to improve are appropriate for chang-

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ing *cultural* activities. If teaching were a noncultural activity, we could try to improve it simply by providing better information in teachers' manuals, or asking experts to demonstrate better techniques, or distributing written recommendations on more effective teaching methods. Note that this is exactly what we have been doing. We have been acting as if teaching is a noncultural activity.

If we took seriously the notion that teaching is a cultural activity, we would begin the improvement process by becoming more aware of the cultural scripts teachers are using. This requires comparing scripts, seeing that other scripts are possible, and noticing things about our own scripts that we had never seen before. Becoming more aware of the scripts we use helps us see that they come from choices we make. The choices might be understandable, but still they are choices, and once we are aware of them, other choices can be made.

Improving cultural scripts for teaching is a dramatically different approach from improving the skills of individual teachers, but it is the approach called for if teaching is a cultural activity. No matter how good teachers are, they will be only as effective as the script they are using. To improve teaching over the long run, we must improve the script.

Of course, knowing what must be done and actually doing it are two very different things, especially when it comes to complex, culturally embedded activities. Once again, we can learn something important by contrasting our own situation with that of others. In the next chapter, we look at how Japan has dealt with the challenge of improving teaching.

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