

# Chapter 4

## Values of the Japanese Mathematics Teacher Community



Douglas Lyman Corey and Hiroyuki Ninomiya

**Abstract** In this chapter, we analyse three fundamental practices of Japanese mathematics teachers to better understand the set of community values that influence their work as teachers. The three fundamental practices are: writing detailed lesson plans, *kyozaikenkyu* (a planning practice), and emphasizing student mathematical reasoning in instruction. An analysis of these community practices resulted in eight potential values of the Japanese mathematics teacher community. These values help the field better understand why Japanese teachers engage in the work of teaching the way that they do.

**Keywords** Japanese mathematics education · Japanese mathematics teaching values · Japanese in-service training

### 4.1 Introduction

Early work by Alan Bishop on values and valuing, and the closely tied work to cultural aspects of teaching and learning, focused on the mathematics classroom (Bishop 1988). That is, the values studied were those of western mathematics portrayed, implicitly or explicitly, by the teacher to the students. Researchers have extended the focus to include the values of the teacher and the values of the students (Seah and Wong 2012; Law et al. 2012). In this chapter, we continue to extend the scope of the values and valuing research. We extend it beyond individual teachers to a particular teaching community, Japanese mathematics teachers. This community level view in many ways hearkens back to Alan Bishop's original work on the six values of western mathematics (rationalism, objectism, control, progress, openness, mystery), since those values are really about the values of a community, mathematicians working in

---

D. L. Corey (✉)  
Brigham Young University, Provo, UT 84602, USA  
e-mail: [corey@mathed.byu.edu](mailto:corey@mathed.byu.edu)

H. Ninomiya  
Saitama University, Saitama, Japan  
e-mail: [hiro2001@mail.saitama-u.ac.jp](mailto:hiro2001@mail.saitama-u.ac.jp)

the western tradition. In this study, we look at three particular community practices of Japanese teachers and analyze these practices to uncover potential values of the Japanese mathematics teacher community. We also build on already existing work about values in Japanese culture and hypothesize how those get embodied in the community of Japanese mathematics teachers.

## 4.2 Framework

As a field, we have not yet built a consensus on what should (or should not) be considered a value (Bishop et al. 2003). Like many other constructs, there remain to be several different definitions of values (in mathematics education). This has also been complicated by other considerations, such as the unit consideration (personal or community/cultural values), the distinction consideration (How are values different from other related constructs such as beliefs, emotions, preferences, and orientations?), and the uncovering consideration (How do we find out what values individuals and/or communities hold?). Some previous work has been done on these issues (see the review by Bishop et al. 2003) but there is more work to do (Cai and Garber 2012). In this section, we explain how we view values at the community level in contrast to the individual level, since community values are the focus of our study.

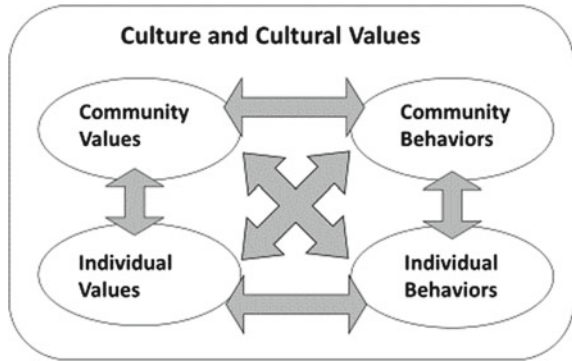
A general definition of a value has been drawn from the writings of many scholars by Bishop et al. (2003). (We refer the interested reader to their article for the long list of scholars that they drew upon for their definition). These scholars define a value as “a construct or ideal, which refers to the desirability, preference, worthiness, priority, moral rightness, or the potential benefit of particular objects, phenomena, actions or goals” (p. 723). A powerful distinction between beliefs and values can be made by thinking about beliefs attached to the dichotomies ‘true/false’ or ‘correct/incorrect’, while values are connected to the dichotomy of ‘good/bad’ (Kluckhohn 1962) or ‘desirable/undesirable’ (Rokeach 1973).

A statement of a value always involves two aspects that often remain implied: first, the individual or community holding the value and second the object, idea, or behavior that is the phenomenon of valuation. Bishop (1988) listed six values of western mathematics. Implied in this statement is the community (mathematicians working in the western tradition), and the phenomenon (the practice of mathematics). Of course this strict distinction is an ideal because when trying to understand the valuing of cultural phenomenon, it may be hard to separate the phenomenon and the value of that phenomenon (remove the value and that could significantly change the meaning and nature of the phenomenon).

Figure 4.1 suggests some relationships between behaviors and values and between individuals and communities. Of course, this is an oversimplified model and other influences on behavior exist beyond what we highlight with this diagram.

We have tried to highlight three different levels where values may be present: The top-level culture (in our case a country), the community (in our case, Japanese mathematics teachers), and the individual (a particular mathematics teacher). In reality, an

**Fig. 4.1** The influence of behaviors and values at the individual and community level



individual is part of many different communities and may be influenced by multiple top-level cultures. An individual’s values would be influenced by the values of all of those communities and cultures and their past experience.

We do not imply with our arrows that values determine behavior, nor that behaviors of individuals determine community behaviors or values, nevertheless, although not a determinative influence, the arrows indicate that there is an influence. Values can influence behavior and behaviors can influence values, since values are not fixed but can evolve overtime, and likewise behaviors may also change over time in response to external pressures apart from values.

Community behaviors are not the same as the aggregate of individual behaviors (although that is an important part), since communities can engage in behavior or develop institutions that are beyond aggregate behaviors of individuals. Although the arrows are drawn as the same size (representing the same strength), depending on the community that is the focus of study, some arrows could carry less influence and could be drawn thinner or dashed (depicting less influence), but that would depend on particular communities and the relationships of individuals within the community.

It is also useful to discuss briefly some top-level cultural values for the subjects in our study, being Japanese, because these top-level cultural values may be significant in helping us understand values of the Japanese mathematics teaching community. There are Japanese ideas that are very difficult to describe in English, or cannot be captured adequately through simple translation, since no word or phrase is sufficient. Moreover, these ideas are fundamental to being Japanese or understanding Japanese culture. Six such ideas were discussed by Wierzbicka (1991): *amae*, *enryo*, *on*, *wa*, *giri*, and *seishin*. We cannot explain all of these here in detail, but the last two may add insight to our study. Of course, our brief explanation of these will be insufficient but such an explanation will be better than nothing. *Giri* is the feeling of obligation one should feel when someone does something nice to you or to your employer. *Seishin* is the importance of working hard toward a worthwhile goal, even if it will take a very long time to achieve. These two characteristics could place a heavy burden on teachers, or any worker, to work hard at their craft to become the best teacher they

can and serve their students (which in one sense are the employers of the teacher) to the best of their ability.

Two other notions of Japanese culture that are hypothesized to have connection to mathematics teaching by Baba et al. (2012) are the ideas of *jutsu* and *waza*. “This *jutsu* concept involves aiming to pursue its object to the fullest extent, and in the process to acquire the very nature of its technique, called the *waza*... the pursuit of *waza* goes beyond simple technical aspects, and leads to nourishment of the spirit and personality formation” (pp. 31–32). Baba et al. (2012) explains that it appears from their analysis that mathematics teachers in Japan view their work as a *jutsu*, and they can acquire the *waza* of their craft through extensive study, practice, and hard work.

## 4.3 Current Study

### 4.3.1 Context of the Overarching Study

This chapter presents the results that have come from a larger study. A group of three US and three Japanese mathematics education researchers has been engaged in a long-term cross-cultural study focused on understanding the nature of high-quality instruction as well as the work of teaching in the two countries. Our study has been ongoing from 2011. As part of that study we have been engaged in watching public-school mathematics instruction (from 2nd to 10th grade) together in both countries (mainly focused in the greater Tokyo metro area in Japan and the intermountain west in the U.S.). These include in person observations as well as video recordings. We have also observed mathematics education courses and professional development, particularly lesson study in Japan. Since the overarching purpose of the larger study was to better understand the nature of high-quality instruction, the sample of teachers in the study were teachers that researchers felt were remarkable at teaching mathematics.

Data collected as part of this larger study include 10 videos of lessons in Japan, 6 videos of US lessons, 4 videos of Japanese post-lesson discussions as part of Lesson study, and videos of conversations between the Japanese and US researchers discussing their observations of lessons (about 20 hours). All Japanese lessons and discussions were translated into English. Research notes were taken for all of our meetings, particularly meetings via SKYPE, which were not recorded. Some semi-structured interviews were used to better understand a particular practice in Japan, *kyozaikenkyu* (see Mellville 2017, for interview details).

We have engaged in ethnographic-type participant-observer experiences in each other’s countries to better understand the phenomenon of our study. About twice a month, we engage in regular conversations via SKYPE to continue our collaboration when we are not meeting in person. We have also interviewed teachers from

both countries about their teaching and their teacher planning practices and their professional development activities.

### 4.3.2 Analysis

For the study described in this chapter we wanted to better understand the values of the Japanese mathematics teacher community. We performed two different analyses in this study, a thematic analysis to generate a list of potential values of the Japanese mathematics teacher community, and a member checking analysis to test the agreement of a large group of Japanese teachers with our generated list of potential values. We cover each in turn, but first discuss one important methodological difficulty in discovering community values based on community behaviors.

Uncovering possible community values contributing to a particular behavior poses a problem. An attempt to ask members of the community (Japanese mathematics teachers) about why they engage in the particular behavior (*kyozaikenkyu*, for example) would result in many different responses. However, it seems illogical that a constellation of different individual values leads individuals to engage in a specific, unique behavior. It seems much more likely that there is a set of deeper culturally driven values, perhaps supported by institutions and institutional environments, that has a strong influence on all of the Japanese mathematics teachers.

The issue here is that the teachers' initial responses may be another outcome of a particular value (or set of values) and not the value itself. In the same way that we could probe why they do *kyozaikenkyu*, we could probe why their initial responses are important. We could continue to ask such questions about their responses until the teachers are drawing on the most fundamental ideas to their practice, or the values that influence their practice. It still might take some methodological analysis to articulate the shared value(s) because the value(s) might still be implied by the responses. In our particular example of *kyozaikenkyu*, we might discover that all of the teachers are sharing ideas related to the great responsibility they feel for their students' learning. This sounds much more like a community value that is influencing Japanese mathematics teachers (community) to engage in *kyozaikenkyu* (a specific behavior).

#### 4.3.2.1 Thematic Analysis

Our first analysis was a thematic analysis for latent patterns (Boyatzis 1998) in our observational data and discussions and it resulted in the listing and description of 8 community values. To develop these values we began by picking three community behaviors that emerged in our larger cross-cultural study as engaged in by the Japanese mathematics community but not widely practiced by US mathematics teachers. The behaviors are: (1) Emphasizing student mathematical reasoning and thinking in instruction, (2) *Kyozaikenkyu*, and (3) Detailed lesson-plan writing. Our

study is not a comparison study between Japan and the US. We have used the comparison to the US here to find practices that are more likely to be uniquely Japanese. The idea is that the more unique the behaviors to the Japanese, the better chance we have of finding values of Japanese mathematics teachers

For each of these three community behaviors the two authors (one each from the US and Japan) generated a list of possible community values. This process began by hypothesizing possible values in back-and-forth conversations between the two authors of the paper. The role of the US researcher was largely that of an outside observer that knew a lot about teaching mathematics in Japan, but was not enculturated into the Japanese teaching community. This allowed the generation of hypothesized values that may have been difficult to see by someone within the Japanese teaching culture. Hypothesized values were then initially vetted by the experienced Japanese mathematics education researcher, who could at least partially evaluate the credence of the hypothesis as a Japanese teaching cultural insider and as specialist in the field. The US researcher who used knowledge gained from the larger study to generate potential confirming or disconfirming evidence of a particular value also vetted hypothesized values. Hypothesized values were either rejected or revised and then discussed again. The revisions often came in the form of hypothesizing a deeper community value that may be more fundamental than one or more other hypothesized values. Seeing a pattern (Bolyatzis 1998), or underlying theme, across multiple potential values often produced a more fundamental hypothesized community value. This analysis resulted in eight values associated with at least one of the three community behaviors that were fundamental and passed the vetting process of both researchers. The eight potential values are: logical thinking as a life skill, deep understanding of mathematics, being true to the mathematics discipline, responsibility for student learning, adaptation to students, mastering the teaching craft, responsibility for community improvement, openness of teaching practice. These are explained in detail later in the chapter.

#### **4.3.2.2 Member Checking Analysis**

In order to triangulate our results we performed a small respondent validation study by asking Japanese teachers about their agreement to our results. A survey was administered to 84 elementary and junior high school teachers asking them to rate the extent to which the Japanese mathematics community shared these eight identified values (not their individual agreement) on a four point scale (strongly agree, agree, disagree, strongly disagree). Although asked specifically to consider the values of the Japanese mathematics teacher community, and not their own values, the teachers surveyed may have indeed considered their own values in responding to the survey. However, if there is still overwhelming support for these values, even if teachers considered their own values on the survey, we consider that as strong evidence that they are values of the teaching community. If participants disagreed, they were asked to make comments about why they disagreed.

## 4.4 Results

For each of the three phenomena we describe the behavior, why it is of interest to us, and what community values may be strongly influencing each. After describing each of the eight values, we share the results of the teacher survey.

### 4.4.1 *Emphasizing Student Mathematical Reasoning and Thinking in Instruction: Behavior*

As part of our study, both Japanese researchers and US researchers observed a US teacher's high school lesson on the topic of inverse functions. The response of the US mathematics education researchers was underwhelming. They (including the lead author of this chapter) pointed out many problematic issues with the lesson: the teacher often spent too much time with one pair of students, the teacher would let anyone respond to questions (basically whoever was most vocal and persistence) and, in this class, that meant assertive males were answering the vast majority of questions and making the most comments, and the teacher let some segments of the lesson go too long. The US observers thought it was a mediocre lesson for these reasons.

The Japanese cohort pointed to different characteristics of the lesson. The teacher had asked the students to find both compositions of two linear functions. The students did so and the results were, of course,  $x$ . The students started to wonder why this was and started to ask questions about the phenomenon. After some class discussion about functional processes the teacher then had the students write out, in words, the process certain functions applied to numbers. Then the students wrote out the process, in words, that would “undo” the process. For example, students wrote  $f(x) = 3x + 2$  as the function process that “multiplies a number by three then adds two.” The students noticed that the “undoing” process had the inverse operations but in the reverse order of the original function. Using the same example as before, the students realized that to undo the process represented by  $f(x) = 3x + 2$  the students would need to “subtract two and divide by three,” or represented differently,  $g(x) = (x - 2)/3$ . Consequently, there was more class discussion about this case. Finally, the class looked at graphs of two functions ( $f(x) = \sqrt[3]{2x + 2}$ ,  $g(x) = 1/2(x^3 - 2)$ ), these complicated shapes, chosen carefully, helped the students consider why the graphs of a function and its inverse are reflections of each other across the graph of the line  $y = x$ .

In contrast, the US mathematics education researchers only looked at teacher and student interactions and some management issues, as noted above. But the Japanese, as well as seeing what the US observers saw, also looked at the mathematical reasoning and mathematical activity in which the students were engaged. Hence, the focus of the Japanese and US observers were quite different. The Japanese were very impressed that the teacher had set up a situation where students were authentically

puzzled and really wanted to know what was going on when they kept getting “x” as the answer for the composition of functions. Interestingly, the Japanese observers agreed that all of the issues raised by the US teachers were valid concerns. However, the Japanese considered that mathematical reasoning and the authentic questions from the students to be significantly more important factors in the quality of the lesson, in effect, trumping the problematic issues of the lesson.

#### ***4.4.2 Emphasizing Student Mathematical Reasoning and Thinking in Instruction: Values***

What values might lead to Japanese teachers to prize the mathematical reasoning and problem solving of students in class? Corey et al. (2010) argued that the intellectual engagement of students was the primary principle that Japanese cooperating teachers emphasized with their student teachers. However, why is it prized? Is it valued in and of itself, or might there be deeper values that influence teachers to prize the mathematical thinking and reasoning of students?

Our analysis of this particular behavior generated three potential community values.

##### **4.4.2.1 Logical Thinking as a Life skill**

Japanese teachers have been emphasizing the need for students to improve their ability to think for many years (Katagiri 2004), perhaps because of the changing skills needed for future employment, where automation are replacing many jobs. Whatever the cause there is a strong feeling that students need to improve their reasoning and mathematical problem solving skills, which is linked to the wider notion of ‘thinking skills’. The Ministry of Education recently coined the phrase “Ikiru Chikara,” translated as “surviving power” to capture this dimension of education that education should give students the ability to manage problems in everyday life.

##### **4.4.2.2 Deep Understanding of Mathematics**

Relational understanding (Skemp 1976) or deeper understanding of mathematics is a fundamental goal of teaching mathematics in the Japanese mathematics teacher community. To quote one teacher, “The goal of mathematics learning, for the type of students who memorize mathematical facts and adopt them to mathematics problems, will just be ‘getting a higher score.’ That is not the real purpose of mathematics education. We would like to help them discover mathematical ideas by themselves, for their deeper and relational understanding.” As experienced teachers know, devel-



oping deep mathematical understanding is difficult to do without having students think and reason about mathematics themselves.

#### 4.4.2.3 Being True to the Mathematics Discipline

According to Bishop (1988), one of the main values of western mathematics is *Rationalism*, the use of logical and hypothetical thinking. Japanese mathematics teachers are true to the discipline of mathematics as they emphasize logical reasoning and mathematical thinking. Other values of western mathematics listed by Bishop are also prevalent in the teaching of Japanese teachers, the most salient being *Mystery* and *Openness*. Japanese teachers emphasize *mystery* by using problems that have surprising results or allow students to find interesting patterns. *Openness* is emphasized as students work together to solve problems and as teachers conduct a whole-class discussion of selected student solutions (*neriage*) to deepen students understanding.

#### 4.4.3 *Kyozaikenkyu: Behavior*

Many Japanese teachers engage in a practice called *kyozaikenkyu*, which is translated as “materials research”. This phrase refers to a set of activities as part of lesson preparation. It is mentioned in the literature mainly as a part of lesson study (see the review by Mellville 2017), but it is also undertaken for every day lessons. *Kyozaikenkyu* is not just another name for lesson preparation, since there are some preparation activities that are generally not considered *kyozaikenkyu* (such as making copies for students or typing up a lesson plan). *Kyozaikenkyu* is a cultural phenomenon. There is no explicit definition of what is or is not *kyozaikenkyu* and it is not explicitly taught in teacher preparation programs. Teachers learn the practice from others as they engage in lesson study and interact with their colleagues.

For many teachers, the primary activity during *kyozaikenkyu* is carefully analyzing the textbook to understand the mathematics, considering student thinking about the mathematics, what might the key teaching questions be (*hatsumon*), and the flow of the lesson. Teachers often compare the approaches of multiple textbooks to improve their understanding and to craft the best lesson they can. Other activities teachers engage in during *kyozaikenkyu* include studying the previous year’s lesson plans/lesson notes, studying published lesson plans from lesson study groups or lesson plans from colleagues, or reading books written for teachers (common in any commercial bookstore in Japan). The teachers study these materials to solidify the necessary aspects of a problem-solving lesson: a set of clear goals, the big idea (*kadai*), mathematical task (*mondai*), key questions (*hatsumon*), select and sequence student thinking, whole class discussion (*neriage*), and boardwork (*bansho*).

#### 4.4.4 *Kyozaikenkyu: Values*

Certainly there are practical aspects to *kyozaikenkyu*. The primary goal of *kyozaikenkyu* is to develop a lesson plan and make instructional choices. However, there is also a puzzle here. Why do Japanese teachers spend time studying materials and creating their own lessons (*kyozaikenkyu*) when they have high quality published lessons that they could use without modification in their class? There is a phenomenon called “corridor *kyozaikenkyu*” where the teacher is preparing while walking down the hall to the classroom. This is frowned upon and these lessons are not considered good lessons. The following values might add some insight into this puzzle.

##### 4.4.4.1 Responsibility for Student Learning

Japanese teachers feel an overwhelming obligation to help their students learn. Teachers naturally feel that it is their fault if students are not learning well, and so the teacher must redouble their efforts to help their students. We described an alternative situation to teachers in the larger study in which a teacher could justify that it was the students’ responsibility to learn as long as the teacher prepared a lesson and taught the required material. The response from the Japanese teachers was that such a thought would be nearly unthinkable, and that “good teachers” would not think that. Doing *kyozaikenkyu* is one way for teachers to prepare themselves and a lesson that gives students the best chance to succeed. A Japanese teacher would feel bad if their students were not learning as much or as well as the students in other teacher’s classes in the same school.

##### 4.4.4.2 Adaptation to Students

Earlier we described a puzzle, that Japanese teachers still spend time crafting or developing their own lesson even with easy access to excellent “ready-made” resources. One answer to this puzzle is the idea that any published materials are written for a general class, not for a specific class, and that the lesson can be much better if a teacher prepares for their particular students. The following response is from a Japanese mathematics educator that was interviewed as part of our larger study about the importance of adaption:

*Kyozaikenkyu* should be done for today’s students, their students. When they do their *kyozaikenku* they should have their real students in mind. On the other hand, the textbook is generalized, not about specific students. They need to adapt to their students, if they don’t adapt the textbook, it may not be good enough for their students. The information in the teacher’s manual may be an average lesson, but it can be better if they do their own *kyozaikenkyu*, but some give up and just use textbook, and it will be an average just-OK lesson.

Japanese teachers seem to adapt lessons to improve their students' learning experience.

#### 4.4.4.3 Mastering the Teaching Craft

This value is closely tied to the idea of *seishin* as well as *jutsu* and *waza*. Teaching mathematics is viewed as the teacher's craft, or *jutsu*, and to uncover the *waza* to that craft requires consistent and focused effort. It is viewed as noteworthy to work hard for a long time to be good at anything worthwhile (*seishin*). This may be especially true if that craft or activity is your profession. Through *kyozaikenkyu*, teachers are constantly learning about their craft by developing deeper understanding of mathematics, by understanding the ways students think and solve problems, by learning other ideas or strategies from their colleagues, by modeling lessons like those of expert teachers, and by understanding which small choices (like the phrasing of a question) can make a big difference in what and how students think and learn.

#### 4.4.5 Detailed Lesson-Plan Writing: Behavior

On one occasion, as part of our larger study, two US teachers were preparing a set of special lessons on understanding matrix multiplication (what it means in a particular context and why we multiply matrices with what otherwise seems as an arbitrary procedure). The Japanese colleagues asked the US teachers to send them a lesson plan a few weeks before the Japanese cohort came to the US so they could be better prepared to learn from the lesson observation. The US teachers were at a loss about what to send. They did not know what the Japanese colleagues expected, and it is also not a common practice to write out lesson plans for colleagues for most US teachers. The US teachers sent a copy of the prepared handout, which the students would work from and fill out during the lessons. The handout included the stated tasks and some follow up questions. The Japanese were surprised that it was considered the lesson plan and did not find it very satisfying, asking again for a lesson plan to be sent to them.

Almost all Japanese mathematics teachers can develop a detailed lesson plan (a lesson plan like those shared with lesson study participants). It was very surprising for our Japanese colleagues that these two expert US teachers could not write a detailed lesson plan. What was also surprising was the fact that the lessons the Japanese observed were very good, so the US teachers were prepared and the lesson was well thought out. However, they still struggled to communicate their plan and thoughts to the Japanese observers, shocking our Japanese colleagues who equate careful preparation and writing a detailed lesson plan.

Unlike the vast majority of US teachers, Japanese teachers have ample opportunities to consume and develop detailed lesson plans. Experience in writing detailed lesson plans begins as pre-service teachers. For in-service teachers, lesson plans are

a key tool in every step of the lesson study process and a fundamental way of sharing instructional knowledge with peers.

#### **4.4.6 Detailed Lesson-Plan Writing: Values**

Since detailed lesson plan writing is closely related to the practice of *kyozaikenkyu*, the values of *kyozaikenkyu* apply here as well, particularly the value of mastering one's craft. The best lesson plans tend to come from the most capable and experienced teachers. We share two more values that seem most pertinent to writing detailed lesson plans. One is based on a responsibility, and one on openness.

##### **4.4.6.1 Responsibility for Community Improvement**

Among Japanese teachers there is a culture of helping each other succeed. In schools the teachers have common offices so it is easy for teachers to freely help each other as they prepare their lessons and do *kyozaikenkyu*. Teachers benefit from teachers at other schools who have published lesson study lesson plans, written books for teachers, or published in teacher magazines. They also benefit from in-person interactions at lesson study conferences and teacher math circles. Teachers get help from other teachers, especially when they are young. Recall that one of the cultural values of Japan mentioned earlier is *giri*, the feeling of obligation one should feel when someone does something nice to you. Teachers naturally feel that they should give back to the community that has helped them so much. Engaging in lesson study and writing and sharing detailed lesson plans is a way to contribute back to the community.

##### **4.4.6.2 Openness of Teaching Practice**

Related to the previous value of contributing to the improvement of the community is the value of openness of one's practice. Without a willingness to share ideas, to observe others teach, to have others observe you, and to collaborate with colleagues then little improvement could be made, both individually as well as a community. This is most prominent in lesson study, but exhibits itself in other ways as well. Sharing detailed lesson plans is one way to open up your thinking as a professional to others in the profession.

#### **4.4.7 Confirmation Study Results**

The results of our confirmation study are displayed below in Table 4.1. We have tabulated the responses for each of the four ratings: strongly agree, agree, disagree,

**Table 4.1** Survey results from 84 elementary and junior high Japanese teachers

Eight identified values	N	Strongly agree	Agree	Disagree	Strongly disagree	Mean
Logical thinking as a life skill	84	37	43	4	0	1.6
Deeper understanding of mathematics	83	11	50	21	1	2.1
Being true to the mathematics discipline	84	35	44	4	1	1.7
Responsibility for student learning	82	54	27	1	0	1.4
Adaptation to students	81	46	35	0	0	1.4
Mastering the teaching craft	82	52	28	2	0	1.4
Responsibility for community Improvement	82	42	39	1	0	1.5
Openness of teaching practice	81	46	32	3	0	1.5

and strongly disagree. We have also displayed the mean of the responses, with  $SA = 1$ ,  $A = 2$ ,  $D = 3$ ,  $SD = 4$ . There were very few negative responses and all of the averages were less than 2 except for one value: Deep Understanding of the Mathematics. Many of the teachers that marked disagree or strongly disagree for the value “Deep Understanding of Mathematics” commented that procedural skills and doing well on exams was also important, not just a deep understanding. Almost half of the teachers (7 of 15) that explained why they disagreed with the statement stated or implied in their comment that they personally agreed, but either both were important or “unfortunately” teachers must focus on tests because of parents and the reality of entrance exams.

## 4.5 Discussion and Conclusion

We have pointed out eight potential values of the Japanese mathematics teacher community. We do not claim that these are all of the important values of the Japanese teaching community, but they do seem fundamental in their influence on core community practices of Japanese mathematics teachers. The contrast on the confirmation

study between deeper mathematical understanding and proficient exam scores actually helped to point to another possible community value: high performance on entrance exams. However, this will need further research, since this was outside the focus of the larger, long-term study. The comments also were inconsistent, with some indicating that high exam scores was not a core value of Japanese teachers, but of parents. However, some teachers said that they feel obligated to emphasize skills in their instruction at a level that sacrifices deep understanding to support parents and students quest for high scores.

We have emphasized looking at values at different levels. Although values can vary between individuals, we think it is valuable to think of values of communities and values of cultures. The values communities hold can strongly influence the values of individuals that are enculturated into that community. This phenomenon fits our experience studying Japanese teachers.

Is knowing specific community values of Japanese teachers worthwhile or meaningful? Well, they may be when trying to take effective practices from one culture/community to another. Implementing a practice in a new community where values are different will not likely have the same results (for a discussion about this issue in the context of lesson study see Fernandez and Yoshida 2004). Implementing lesson study, for example, in a country where values such as deeper understanding of mathematics, responsibility for community improvement, mastering the teaching craft, and openness of teaching practice does not exist will probably produce a different outcome in the nature and quality of the teacher interactions as well as the lesson. It may be reasonable to think of the values of a community as part of the treatment of the effect of lesson study (on teacher learning and instructional quality, for example), not just the practice or behavior. If this is in fact the case, then implementing lesson study outside of Japan would probably need to consider how to change cultural norms among teachers, not just practice. This is a far-reaching possibility to which further research attention needs to be directed.

## References

- Baba, T., Iwasaki, I., Ueda, A., & Date, F. (2012). Values in Japanese mathematics education: Their historical development. *ZDM Mathematics Education*, 44(1), 21–32.
- Bishop, A. (1988). *Mathematical enculturation: A cultural perspective on mathematics education*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Bishop, A. J., Seah, W. T., & Chin, C. (2003). Values in mathematics teaching—The hidden persuaders? In A. J. Bishop, M. A. Clements, C. Keitel, J. Kilpatrick, & F. K. S. Leung (Eds.), *Second international handbook of mathematics education* (pp. 717–765). Dordrecht: Kluwer Academic Publishers.
- Boyatzis, R. E. (1998). *Transforming qualitative information*. Thousand Oaks, CA: Sage.
- Cai, J., & Garber, T. (2012). Teaching values and valued teaching in the mathematics classroom: Toward a research agenda. *ZDM Mathematics Education*, 44(1), 91–97.
- Corey, D. L., Peterson, B. E., Lewis, B. M., & Bukarau, J. (2010). Are there any places that students use their heads? Principles of high-quality Japanese mathematics instruction. *Journal for Research in Mathematics Education*, 41, 438–478.

- Fernandez, C., & Yoshida, M. (2004). *Lesson study: a Japanese approach to improving mathematics teaching and learning*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Katagiri, S. (2004). *Suugakutekina kangaekatano gutaikato shido (Mathematical thinking and how to teach it)*. Tokyo: Meijitoshoh. (in Japanese).
- Gluckhohn, C. (1962). Values and value-orientations in the theory of action: An exploration in definition and classification. In T. Parsons & E. A. Shils (Eds.), *Toward a general theory of action* (pp. 388–433). New York: Harper and Row.
- Law, H. Y., Wong, N. Y., & Lee, L. N. Y. (2012). A study into espoused values in Hong Kong mathematics classrooms. *ZDM Mathematics Education*, 44(1), 45–57.
- Mellville, M. (2017). *Kyozaikenkyu: An in-depth look into Japanese educator's daily planning practices*. Unpublished Masters Thesis. Brigham Young University, Utah.
- Rokeach, M. (1973). *The nature of human values*. New York: The Free Press.
- Seah, W. T., & Wong, N. Y. (2012). What students value in effective mathematics learning: A 'Third Wave Project' research study. *ZDM Mathematics Education*, 44(1), 33–43.
- Skemp, R. R. (1976). Relational understanding and instrumental understanding. *Mathematics Teacher*, 77, 20–26.
- Wiersbicka, A. (1991). Japanese key words and core cultural values. *Language in Society*, 20(3), 333–385.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

