Chapter 8
Teacher Learning from Classroom Assessment in Japan: Responsive and Emergent Classroom Assessment in Lesson Study

Terumasa Ishii

Abstract This chapter discusses teachers' classroom assessment as embedded in the Japanese traditional whole-class teaching that revolves around class-level activity. The ideas of "teaching that builds on stumbles" and "stimulation" can provide clues for future assessment research when examined from the perspectives of "assessment for learning". If we strive to have assessment embedded in teaching and learning, formative assessment needs to be framed: (1) not only as a closed reflective process but also as an open emergent process; and (2) not only as a visual and rational process whereby the teacher subject sees the student objects and tries to visualize their learning process but also as a sensual and aesthetic process whereby the teacher naturally develops a sensitivity in the responsive relationship between teacher and students. Thus, there is a need to redefine the concept of formative assessment as "responsive and emergent assessment".

Keywords Assessment for learning · Classroom assessment · Lesson study
Responsive and emergent assessment

Introduction

This chapter discusses teachers' classroom assessment as embedded in the Japanese traditional teaching style.

In Europe and the US, the debate about educational measurement and assessment has historically moved from outside the classroom to inside it, and from relying on testing specialists to teachers and even students (Black and Wiliam 1998; Bloom et al. 1971; Brookhart 2007; Tanaka 2008; Wiliam 2011; McMillan 2013). The edu-

T. Ishii (✉)
Kyoto University, Kyoto, Japan
e-mail: ishii.terumasa.3w@kyoto-u.ac.jp

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Table 8.1 Feature of assessment *of, for,* and *as* Learning

Approach	Purpose	Reference points	Key assessor
Assessment *of* learning	Judgments about placement, promotion, credentials, etc.	Other students	Teacher
Assessment *for* learning	Information for teachers' instructional decisions	External standards or expectations	Teacher
Assessment *as* learning	Self-monitoring and self-correction or adjustment	Personal goals and external standards	Student

(Earl 2013, p. 31)

cational measurement movement aimed to make education scientific and objective. Tyler (1949) proposed the concept of "educational evaluation" as a way to improve educational activities following educational goals; his proposal served as a corrective to the measurement movement's stance of not specifying the aim of measurement. Bloom et al. (1971) proposed "formative assessment" as a way to revise and improve the trajectory of ongoing educational practice, rather than only evaluating after the fact and for grading purposes. In recent years, under the heading of "assessment for learning" formative assessment has been integrated into the everyday mutual interactions of teaching and learning in the classroom. Moreover, under the heading of "assessment as learning", research on learner metacognition, self-regulated learning, and educational assessment are abundant and connected, opening up for further exploration of how teachers and students can understand assessment data and improve learning (see Table 8.1).

In contrast to these developments in assessment research in Europe and the US, test specialists and others in Japan have not necessarily accumulated enough measurement and assessment research, yet this does not mean that assessment has not been conducted in Japan. Rather, Japanese teachers, especially elementary school teachers, have worked to sincerely understand the children and to generate excellent teaching and learning through creative whole-class teaching that systematizes children's speech and thinking as well as facilitating deeper reflection through classroom discussion (Tanaka 2017). The act of assessment was embedded in the teacher's teaching process, in the creative dialogue between teacher and children. In recent years, the maturation of "lesson study", highlighted as a culture of teacher co-learning in Japan, is intimately connected with the craftsmanship of the teachers who have strived for creative whole-class teaching (Ishii 2017).

That is to say, lesson study in Japan has developed as a setting where teachers can observe and emulate each other's skills, where they can show and cultivate those skills, and where they debate practical philosophy and their profound beliefs as investigators, who seek after the truth. Behind lesson study lies the craftsmanship of Japanese teachers, who understand hourly lessons as a complete experience that is performed and carefully created like a drama.

These teachers' art of response, inherently fulfilling an evaluating function, has much in common with the ideas behind "classroom assessment" and "assessment for learning". This teacher responsiveness, which is supported by various tools that visualize children's thinking, has usually been discussed regarding teaching technique and cultural script of teaching (Tulis 2013; Arani et al. 2017). By examining this from the perspective of formative assessment, we should find suggestions that can add to the recent assessment scholarship, which aims toward an assessment that is embedded in classroom teaching and learning.

This chapter first introduces some cases that became the historical beginnings of the creative dialogue teaching style. By analyzing these cases, I extracted the fundamental idea of "teaching that builds on children's stumbles or mistakes" and discussed the clues provided toward future research on formative assessment. Based on this, I consider practical systems and tools that may help make possible creative dialogue in teaching and improve teachers' assessment competency in the teaching process.

The Relationship Between Classroom Assessments and Teacher Learning

I will first discuss the significance of looking at teachers' learning to investigate classroom assessment through a consideration of the history that led to the focus on the importance of classroom assessment.

In "standards-based reform" and "outcome-based reform", which create competition between schools based on the results of standardized tests, assessments function as a tool to rank and control children, teachers, and schools. The importance of classroom assessments was identified as part of grassroots initiatives to reconfigure assessments as a tool to improve schools and identify quality and fairness in education (Ishii 2011). For example, under the heading of "authentic assessment" (Archbald and Newmann 1988; Wiggins 1993), the new paradigm of assessment was proposed in the USA at the end of the 1980s as part of the criticism directed toward standardized testing, leading to the creation of new techniques and ways of thinking about assessments such as "performance assessments", "portfolios", and "rubrics". These were intended to make visible the authentic achievement fostered by teachers' creative teaching practices that were evident in each classroom and school.

One of the concepts in this new paradigm was that the teachers in the classroom were best placed to assess the authentic achievement or competence of students as they could understand the quality of the child's learning in the specific context in which they were placed. Classroom assessment is based on the teacher's daily practice and accompanying qualitative judgment. In assessment reform based on classroom assessment, it is more important to have faith in the teacher and allow his or her assessment capabilities to grow than it is to develop new assessment tools and technologies. Also, as will be discussed at length later in this chapter, responsiveness

and reflective thinking in the practice process form the core of a teacher's abilities, and it is important in a teacher's learning for them to reflect on, and learn from, their experiences. Building a teacher's assessment capabilities through classroom-based assessments is the central theme of teachers' learning. It is crucial to note that lessons in Japan are not intended to be an application of technologies developed outside of the classroom, but should be a craft-like endeavor where the teacher creates activities with the child in the classroom. Creative whole-class teaching, which is now the ideal image of lessons in Japan, requires a teacher's assessment capabilities to be an art form. Starting with lesson study, the teacher's learning systems that make creative whole-class teaching possible contain the strategies and tools to enhance teachers' assessment capabilities.

In this way, an emphasis on classroom assessment will not exist without teacher learning, and the quality of classroom assessment holds the key to it. In the next section, I will discuss case studies that form the historical starting point of creative whole-class teaching based on responsive dialogue.

The Beginnings of Creative Whole-Class Teaching in Japan

A good number of Japanese teachers have pursued creative whole-class teaching as a way to realize learning on a class level, drawing out and facilitating cross-pollination of the thoughts of individual children. Through the exchange of various ideas and the stimulation that occur as they intermingle, the children can make discoveries and construct knowledge in ways that would not have been possible if studying individually. By implementing this method, teachers have sought to enable learners' growth and achievement, while also enriching the learning process. The teaching methods of Saitō (1958) and Tōi (1987), practitioners of the post-World War II era, are the epitome of this. In the following sections, I will introduce practical examples from the teaching of both of them, during the 1950s, and clarify their characteristics from the perspective of classroom formative assessment.

Case ①—Teaching that Investigates Children's Stumbles Through Cooperation

I will first introduce one 2nd grade elementary math class led by Sakiko Funato, a teacher at Shima Elementary School whose principal was Saitō (1958).

The students were learning 2-digit multiplication, and as Ms. Funato was walking around checking the students' calculations, she noticed that Sakae had calculated $90 \times 70 = 63{,}000$ and that other students had made similar mistakes. Since this was their first time doing 2-digit multiplication, Ms. Funato wanted them to learn

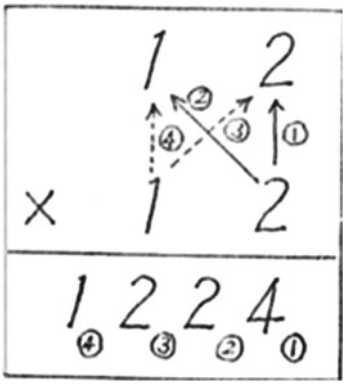

Fig. 8.1 Sakae's mistake (Saitō 1958, p. 236)

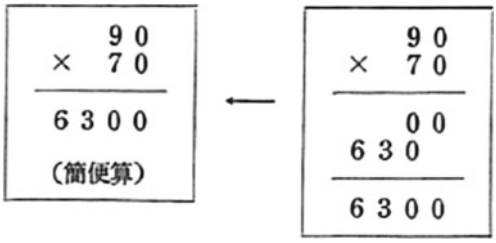

Fig. 8.2 Shortened calculation (Saitō 1958, p. 238)

it properly. She decided to show Sakae's mistake to the whole class and have them solve it together (see Fig. 8.1).

Ms. Funato asked Sakae to write and explain her calculation using the blackboard. Sakae wrote the calculation as shown in Fig. 8.1 (in the order of arrows ①–④ as shown in the figure). In response, some students said that it was wrong and the classroom atmosphere became lively. Ms. Funato told the students not to be harsh on Sakae for having made this mistake, but urged them to think about how this mistake happened based on the method shown on the blackboard, independently of Sakae. An active discussion followed, with exchanges such as, "Maybe Sakae followed the same pattern as for when we did 24 × 40?" and "No, that wouldn't give this answer" (Saitō 1958, p. 237). It became clear that even among the students who had reached the correct answer, there were several who had not understood the meaning behind the shortened calculation.

Ms. Funato retaught the students how to approach the shortened calculation process for 90 × 70, making a clear distinction between calculating 12 × 12 and 90 × 70 (see Fig. 8.2). In the end, it was clarified at what point Sakae's calculation had gone wrong and everyone, including both Sakae and many students who had been confident about their calculations, had gained a deeper understanding of 2-digit multiplication. Ms. Funato happily announced that this was a "Sakae-equation

mistake," celebrating that Sakae, as well as the other students, had worked together to generate joint knowledge to avoid repeating this mistake.

In Ms. Funato's class, opportunities to look at mistakes together were regularly given to students. In the beginning, there were those who hesitated to show their mistakes to others, but by building joint knowledge in the form of "so-and-so-equation mistakes", an atmosphere conducive to openly sharing mistakes was created. Moreover, it was observed in later classes that students could cooperate by remembering what they had learned previously, pointing out that "that's a so-and-so-equation mistake".

In Ms. Funato's classroom, students did not only explain their calculations but were also given the opportunity to examine other students' calculations and imagine how that student reached his or her conclusion. Take the following problem: "Every student in Tadashi's class buys one pencil at a price of 3 yen and 50 sen each. How much did they pay if the number of students was 40?" Let us say Jirō writes his calculation ($40 \div 2 = 20$, $3 \times 40 = 120$, $120 + 20 = 140$) on the blackboard and another student explains it by saying, "The first 40 is for the number of students. He divided 40 by 2, because 50 sen is one-half of 1 yen so that if they each pay 1 yen, it's 40 yen. Because it's half that, he divided by 2, $40 \div 2 = 20$, meaning 20 yen" (Saitō 1958, p. 246). Ms. Funato then asked Jirō if he agreed with the explanation and he nodded happily.

When discussing Hisako's calculation ($50 \times 40 = 2000$, $3 \times 40 = 120$, $120 + 2000 = 2120$), one student remarked, "That's a bit odd," to which Ms. Funato replied, "If something's a bit odd, let's fix it together by thinking about Hisako's method" (Saitō 1958, pp. 252–253). At this point, one student pointed out the reason for Hisako's stumble, saying, "I think $50 \times 40 = 2000$ is about sen. And I think the unit for $3 \times 40 = 120$ is yen. But Hisako went wrong when she mixed them up by counting $120 + 2000 = 2120$" (p. 253). Going further, the mistake was corrected by providing an imaginative explanation that followed Hisako's thought process, explaining, "50 sen is 0.5 yen, so 50×40 should be $0.5 \times 40 = 20$, meaning 20 yen. And then we have $3 \times 40 = 120$, so that's 120 yen. Together it's $120 + 20 = 140$, meaning 140 yen" (p. 253). Here, we can see how the students discovered their stumbles by themselves, thought about why they had stumbled and learned their lessons jointly.

Case ②—Teaching that Stimulates Students' Thinking Through One Student's Stumble

Next, I will introduce a summary of the teaching of *The Burning of the Rice Field*, which was conducted among 5th grade elementary school students by Tōi at the end of the 1950s (Kawaji 2005; Tōi 1987).

The Burning of the Rice Field is a story in which a village headman named Gohee has a premonition that a tsunami will hit his village. To save the 400 villagers from

the tsunami, he sets fire to the rice fields, which are awaiting the harvest, inducing the villagers to flee to the top of a hill to escape the fire, and saving their lives. In reading this work, Student A wrote in his notebook a reading that differed from the author's intent. The scene described how Gohee set fire to all of the rice fields, threw away his torch and gazed out at the coast. Student A wrote, "Gohee has burned all of the rice plants that had produced a bumper crop, and then is gazing out at the coast while probably thinking to himself that he has done a regrettable thing" (Tōi 1987, p. 135). Tōi had Student A present this reading during group in his class.

When he had done so, the other classmates unanimously muttered: "That's strange!" Accordingly, Tōi intentionally posed a question that supported Student A: "So Gohee set fire to the rice that had been harvested with such difficulty, and then probably thought that he did something regrettable, right?" (p. 136). When the teacher said this, the students said, "If it were us, we would probably think that we had done a regrettable thing, but we think that that is not the case with Gohee" (p. 136). In response, the teacher asked, "If so, what is the evidence for that?" (p. 136). With that question, the students eagerly set about finding the evidence.

When they had thought about it for a time, Student B called out, "Before Gohee set fire to the rice fields, he said "It is a waste, but I can save the lives of the entire village by doing this." If we read here, we can see that on the one hand, Gohee thinks that it is regrettable that he has set the fire. However, the word "but" is added after that, and that is saying the opposite. Here, he is weighing the value of the rice against the lives of the villagers. However, as a result of weighing these against each other, Gohee has been able to decisively state that 'the lives of the entire village can be saved by this'" (p. 137). This meaning of Gohee's decisive statement was a point that even Tōi had not noticed. In response to this discovery by the students, Tōi thanked Student A, saying, "Today we were able to engage in a wonderfully vigorous and valuable study; however, if we consider the reason why, it is because Student A shared that reading with us" (p. 139). In Tōi's practice, not only was the reason for the stumble cooperatively investigated but as the teacher actively demonstrated that even the stumble had a point to it, the students who were confident in their correct reading were stimulated, inducing cognitive disagreement, and triggering their thinking.

Formative Assessment Embedded in Japanese Creative Whole-Class Teaching

The teaching methods of Saitō's Shima Elementary School and Tōi are said to be the epitome of Japanese creative whole-class teaching. What they have in common is the idea of teaching that builds on stumbles. In other words, the child's stumble (an erroneous response or opinion that diverged from the correct response) was not treated negatively; rather, "elaboration" was launched with the stumble or "productive failure" as the starting point. This way of proceeding is meaningful not only for the child who has stumbled but also for other children who think that they know the

correct answer. It is common that these children, even when they can express their answer clearly, cannot respond skillfully when pressed about the reasons for their idea. It is possible to achieve a deeper level of understanding by explaining one's ideas and citing one's evidence to a person who may have a different idea, or teaching a person who has yet to understand the point.

This is a kind of responsive teaching that builds on the teacher's perception of the actual conditions of student learning, creative teaching starting from learning assessment. By doing this, the learners' metacognition is fostered, and it becomes a form of teaching that extends teacher assessment to student self-assessment ability, the ability to discover one's stumbles and build on them in one's learning. This certainly resonates with recent ideas about assessment for learning and assessment as learning, and can be seen as attaching importance to "the meta-cognitive formative assessment that investigates children's stumbles through co-operation." Moreover, as seen in Tōi's practice, the stumbles that are uncovered in the formative assessment of the teaching process encourage metacognition through students' reflecting on their thought processes, but, on top of this, they also stimulate their thinking, serving as teaching material that incites cognitive disagreement—material that suddenly appears in the teaching process, which can be used impromptu. Learning-triggered formative assessment stimulates the entire class of students' thinking through one student's stumble. Formative assessment should be framed not only as restorative or developmental guidance aimed at goal achievement, or as something that spurs on learners' self-learning ability—a closed reflective process—but also as something that suggests new learning objectives, triggers students' thinking and subjective participation, and invigorates teaching—an open, emergent process.

Therefore, making it possible for stumbling to happen in lessons requires the creation of an open classroom environment, where students can express anything without fear of stumbling. Many teachers attempt to create a classroom culture that hinges on the belief that classrooms are places where mistakes happen and "you come to school because you can't study by yourself", by giving clear messages to their pupils that stumbling is allowed and that "not being able to do something" is alright. Moreover, the elementary school teacher Imaizumi (1998) explained the importance of the teacher reflecting on his or her views on mistakes to enrich them. Mistakes made by students are created by exaggerating one aspect of the matter. As long as even this one aspect of the matter is in some way connected to reality, then the mistake can be construed as essential to approaching the truth of the matter. If the teacher can genuinely adopt this way of thinking, then he or she will become more naturally attuned to what each student is saying. To create lessons where stumbling happens, it is important to form the students' learning and assessment values which see stumbling, an inability to do something or an assessment opportunity, as an opportunity for learning and growth.

In the next section, I summarize the Japanese view of teaching that forms the background of this teaching that builds on stumbles and values stimulation.

Teaching as a Drama and the Teacher's Art

Teaching as a Drama

There is a tendency when discussing teaching to encounter the extreme argument that anyone can handle teaching if he or she is familiar with the content to be taught, or when there is a manual. In contrast, some may claim that teaching depends on talent and personal charisma. It is certain at least that teaching demands skill and competence from teachers. Teaching is an occupation in which the tone of the teacher's voice, the way in which he or she makes eye contact, and his or her physical stance and posture all make a statement, and in which the personal maturity of the teacher is also consistently under scrutiny. However, it is possible for anyone to achieve such skilled competence by continuing to learn in a research-type fashion amidst one's daily practice, with a proper methodology. This practice is referred to as "teaching as the practice of a profession."

Teaching is a process in which teacher and students interact through the medium of "teaching materials", leading cultural content to be acquired and abilities to be gradually formed. That situation can be established by a deliberate approach based on the teacher's sense of purpose, within a curriculum and learning environment organized by educational intent. Mukōyama (1985), who led the Teacher's Organization of Skill Sharing, cited the following example: "Is it satisfactory for a doctor whose patient says "I have had a high fever for three days' just to express his sympathy by responding, 'That must be terrible'? Would you entrust your life to a doctor who said, about a commonplace disease, 'I do not understand the cause, and I do not know any method for treating it. In any event, I will try to do my best'?" (Mukōyama 1985, pp. 77–78). While citing this example, Mukōyama stated that the teacher's work lay precisely in making it possible for students to do what they could not previously do and that what was needed was not only love and thought but also concrete techniques that could change children's cognition and behavior.

However, what deserves attention here is that techniques in education cannot be implemented mechanically, like a factory, at the convenience of their creator. Every child has his or her personality, and children teach themselves ceaselessly, improving themselves by their desire and effort. Moreover, the occupation of teaching is a creative process in which students interact with each other in complicated ways, where learning often goes beyond the teacher's intentions and is deployed in a rhythm of tension and relaxation in the atmosphere ("teaching as drama"; Yoshimoto 1983). It is precisely because lessons in school are a creative, dramatic process that it is possible to realize comprehensive and meaningful teaching effects, including not only deeper understanding and creative thinking but also rich internal experience (see Fig. 8.3).

As shown in Fig. 8.3, a lesson is a process with a logical, rational structure directed toward a target achievement. However, while it may be possible to learn zweckrational aims when there are "easy-to-see outcomes" such as basic skills, "hard-to-see outcomes" such as thinking processes and dispositions are attained

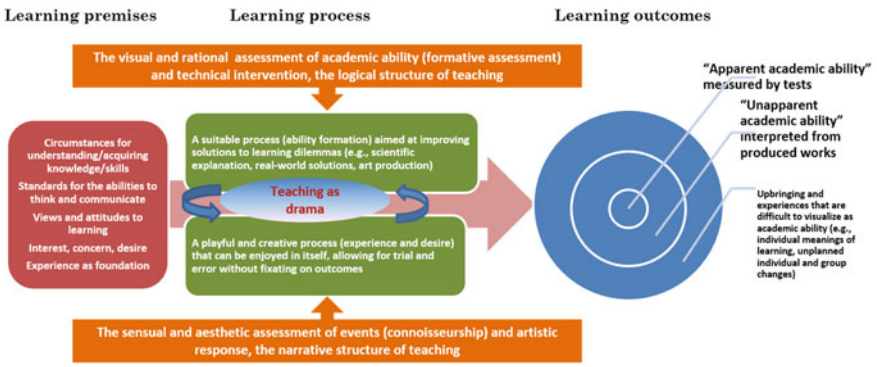

Fig. 8.3 The model of classroom learning and assessment process (Ishii 2012, p. 143)

only through the detours of accidental learning with trial and error, this does not fit within the target framework. Learners develop as humans in lessons through the inclusion of zweckrational structure and playful creativity of the experience. Japan's skilled teachers are thorough in their targets and planning. However, they leave these behind during the lesson process, when they follow the flow of the children's learning and place great emphasis on turning a stumble in a student's understanding of the academic content into an opportunity for learning. Many teachers plan their lessons with great hopes for what they can achieve through such lessons. The paradox that a teacher's targets for a lesson cannot be achieved by direct, efficient progression toward them, but by first beginning learning in a way that does not fit in with the teacher's set plan is now understood to be the essence of any lesson.

By understanding lessons as drama, teachers in Japan have come to appreciate the storytelling nature of learning in each hour-long lesson, and have come to conceptualize lessons with a beginning, middle (climax) and an end. For example, teachers gradually tease out the learners' motivation when they first present the teaching materials, followed by the climax in which they create a setting for the learners to struggle and compete with their differing opinions, finally ending in agreement, or, in cases where more discussion is desired, ending with a buildup of anticipation for the next lesson.

Practical Deliberation and Consideration as the Core of a Teacher's Competency

If we understand teaching as a creative occupation like drama, it becomes clear that it cannot be carried out simply by generalized individual techniques and the application of material or method X. In interactions in which the children, the teacher, and the subject matter are interwoven, the teacher makes a decision instantly. The teacher

receives the individual reactions of the children, reconsiders and recombines his or her techniques to create something new in response, boldly changes the initial plan, or resets the objectives of teaching themselves. What we refer to as teaching technique can be characterized as an art of reception, where the teacher assesses the children's learning and responds.

The importance of such thoughtful judgments, deliberation, and careful consideration in the teacher's work has been emphasized in a variety of forms (Satō 2010; Shibata 1967; Yoshimoto 1983). For instance, Herbart (1806) proposed the concept of "tact of teaching"—the ability to respond as the occasion may demand in teaching, and Lampert (2001) conceptualized it as "dilemma management"—the work of a teacher making split-second decisions from time to time and continuing to make do in response to the innumerable dilemmas that arise in the process of teaching. In daily teaching, which appears plain and unconnected to drama at a glance, a teaching approach is established by the continuation of extemporaneous decisions. As noted by Herbart (1806), educational tact is the minimum requirement but at the same time the maximum requirement for teachers. What determines the level of a teacher's competency is the validity of his or her extemporaneous decisions and the extent of his or her forethought as played out in the teaching process.

We should be able to reappraise this kind of "pedagogical tact" from the perspective of classroom formative assessment. Saitō (1969) expressed the essence of a teacher's capacity for judgment in the classroom as "seeing". Seeing is not to consciously "see", but denotes what naturally enters the teacher's field of vision in the classroom, matching the teacher's level of experience and competency. It signifies his or her sensitivity to the reality of the children and the classroom, connoting the direction of his or her next action. Seeing has less to do with the visual and logical process that assumes a distance between subject and object and more to do with the sensual and aesthetic process that derives from the responsive relationship between subject and object (Fig. 8.3).

Fundamentally, the act of assessment, which should be consciously "seen" as the school's obligation, derives from when the teacher wants to grasp the learning circumstances of all students and devises methods for visualizing them. From this point, we can understand that processes like pedagogical tact and seeing contain elements that fundamentally were never included in the concept of formative assessment. Rather, they seem to have been conceptualized by phrases like "educational connoisseurship" (Eisner 1979) and "reflection in action" (Schön 1983).

To expand the concept of assessment to include sensual and aesthetic sensitivity by responsive relationships, is to reduce assessment theory to teaching theory or, conversely, to reinterpret teaching theory as assessment theory. This comes with the danger of obfuscating the unique meaning of the assessment act. Nonetheless, to embed formative assessment into classroom teaching and learning, we must be aware of both sides, the visual and rational process as well as the sensual and aesthetic process.

A Methodology for Increasing Teacher Competency and Implementing Responsive and Emergent Assessment

The Teacher's Path of Learning

How could a teacher's practical skills and judgment, which include competency for responsive and emergent classroom assessment, be polished? That process takes the form of "learning by doing", like the study of skills in sports and the performing arts (Korthagen 2001; Schön 1983). In other words, it is not a matter of studying theory outside the classroom and applying it in practice; rather, the teacher thinks reflectively over the course of practice and continues to self-regulate his or her practice to make it better, while accumulating discipline as a kind of practical knowledge. Therefore, to polish a teacher's abilities, the key point is how the entire process of design, implementation, and reflection for teaching is to be enhanced by increasing the opportunity for study by teachers themselves.

Also, such learning by teachers is carried out within multilayered joint relationships, in vertical, horizontal, and diagonal directions, among teachers of the same age (horizontal), between them and their senior colleagues (diagonal), and between them and administrative teachers (vertical). For example, the process of learning from expert senior colleagues and creatively imitating them as models is important for inexperienced teachers. "Imitating" as used here does not mean simply mimicking their actions superficially, but also thinking things like "What would Teacher So-and-So think about this?" in response to situations before their eyes, and sharing their vision of teaching as well as their ways of thinking and feeling with the experienced teachers (Ikuta 2011). The more thoroughly the experienced teachers' ways of facing up to problems and objects as practitioners are imitated and implemented, the more likely a younger teacher will be to achieve the confidence and grounding to begin to build his or her personal style and develop a new model which is different from the experienced model teachers.

The majority of the practical knowledge needed to support excellent decisions is hard to put into words that are logical and explicit. Instead, it is accumulated by practitioners individually and in collaboration with implicit sensory and unconscious knowledge rooted in memories of specific episodes and the feelings and meanings attached to them. This kind of practical knowledge is accumulated in communities of practice and learned on an ongoing basis through vicarious and direct experiences and the chance to apply one's intuitive judgment and see it mediated by real episodes and examples (Connelly and Clandinin 1988; Elbaz 1991; Shulman 1986). Crucial elements of this process are thinking in the manner of admired teachers every day, engaging in dialogue about teaching and students with one's colleagues, and reading and writing records of practice. However, to make this kind of practical knowledge not inherent in any specific context, and to be studied as a typical case with generalized versatility, it must be studied through a research cycle as shown in Fig. 8.4.

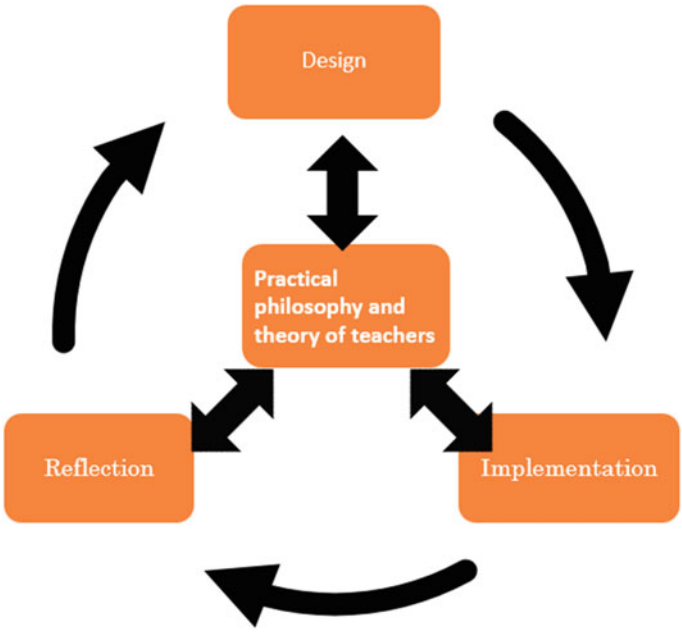

Fig. 8.4 Cycle of teacher's practical research (created by the author)

Figure 8.4 illustrates the cycle of a teacher's practical research: the steps of class development and implementation, design, implementation, and reflection. The direction in which the practical research cycle develops is guided by the philosophy of the teacher, including his or her ideal images of students, classes, and schools, and fundamental values. In addition, the validity of judgments made at each phase is governed by "theory in practice", consisting of tacit knowledge and explicit knowledge concerning curriculum content, students, class format, and classroom management methods built up by the teacher through theoretical learning and practical experience. At the same time, throughout the design–implementation–reflection cycle of educational activities, teacher philosophies, and theories are re-thought in practice. All phases of a lesson—design, implementation, and reflection—incorporate an examination of the target, method, and assessment elements of practice. For example, both design and implementation incorporate assessment. During reflection, the classroom assessment process takes a central role and becomes the point at which not only the validity of the lesson's targets and methods, but also the very method of student assessment, become the subject of scrutiny.

Whether or not the design–implementation–reflection cycle of educational activities becomes the cycle by which a teacher engages in practical research plays a part in teacher learning and growth (Ishii 2016). When the refinement or reframing of a teacher's philosophy, theories, or skills is stimulated, the reflection phase, in particular, does not merely stop with the assessment of student learning in the

classroom, or problem-solving to improve subsequent classes. It is important, in addition to goals and assessment validity themselves, to be subject to investigation and for there to be the discussion that deepens understanding of how educational activities are conceived and executed and the steps by which children learn and create knowledge. Thus, following a cycle of design–implementation–reflection jointly managed with other people is effective in stimulating knowledge creation. These are aspects of lesson study in Japan which have been getting attention in other countries.

Practical Study Tools for Teacher Development Through Teaching

In Japan, in addition to informal learning by individual teachers in their everyday practice, multiple venues for formal learning exist for teachers:

1. Theoretical and methodological/pedagogical lectures and training available through boards of education and universities;
2. Independent external study groups such as nongovernment education research organizations and study circles (where teachers bring records or documents of their regular teaching practice and offer mutual critique); and
3. In-school teacher training focused on lesson study (publicly held classes inside or outside schools offering advance or follow-up conferences).

The purpose of 1 is mainly the acquisition of knowledge and skills, whereas the purpose of 2 and 3 is mainly to exchange practical experience, reflect upon it, and jointly come up with new/better practical theories and methods.

Since the 1990s, lesson study has been about stimulating consciousness and rethinking theory in practice (Schön 1983), which has suggested the importance of post-class case studies. This has gone in two directions, from different starting points: case studies for the study of learning and the study of teaching (Ishii 2014).

An example of the former, case studies for studying learning, can be found in "class conference" by Satō and Inagaki (1996). Sato came to emphasize the importance of pursuing the meaning and connections of learning, in preference to targeting the process of teachers' decision-making in teaching. Furthermore, these learning-centered approaches advanced the development of reflection tools to support teachers' reflection on past practical experience. An example is the card-constructing method developed by Fujioka (2000), in which classes are held and observed, and as many potential problems or concerns as can be thought of are written on cards, one issue per card. Then, the cards are stacked and divided into two groups, which are then subdivided into two again. The divided card groups are labeled, and then a structural diagram is created in which label–pair connections are indicated by lines, and reasons for them and realizations about the groupings are noted. This encourages classroom instructors to visualize how they see their classes, and to become conscious of a variety of things; that is, it fosters teachers' awareness.

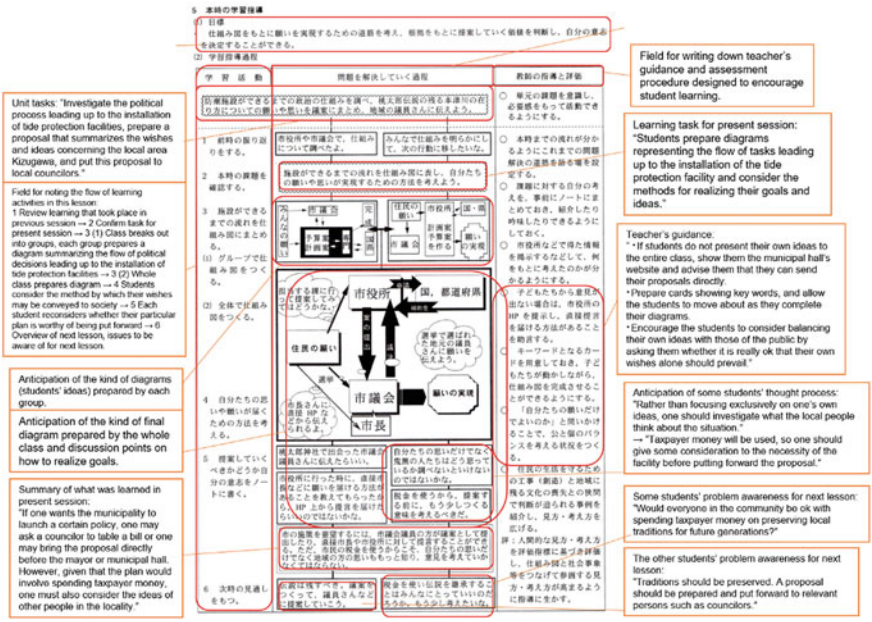

Fig. 8.5 Lesson Plan in Social Studies for 6th Grade Elementary School Students (prepared by Shoji Kawada, a teacher at Takamatsu Elementary School attached to Department of Education, Kagawa University. The boxes within the figure and the annotations are by the author)

Examples of the latter, case studies for studying teaching, are the "intervention class" by Saitō and the "stop-motion method" by Fujioka (1991). In the former, a supervising teacher takes over a class from the one normally instructing, asks the children questions, and intervenes in the class in response (Saitō 1977). In the latter, screening of the video record of a class is temporarily stopped, and a discussion is held on the teacher's teaching method, covering various aspects. The intention is to ask questions on points such as "Why was this approach taken with this subject?" and "What were you seeing regarding the children's learning at that time?" and thereby to investigate the intent of the teacher and the process by which they make judgments that inform their activities.

In addition, in lesson plans prepared in Japanese schools, interactions between teachers and students, particularly the teacher's expectations of the students' learning regarding speech, action, and cognition in response to teacher encouragement, are described in detail (see Fig. 8.5). In addition, blackboard plans visualizing and organizing such communication and thinking processes are often mentioned. Japanese teachers have traditionally stressed visualization processes for cultivating thinking in the classroom using blackboards (see Fig. 8.6). Using blackboards on which lesson material is left after the class has concluded, teachers can check the thinking processes of students and the conclusions drawn, and properly instruct them to put down their learning and thinking processes in their notebooks, deepening their think-

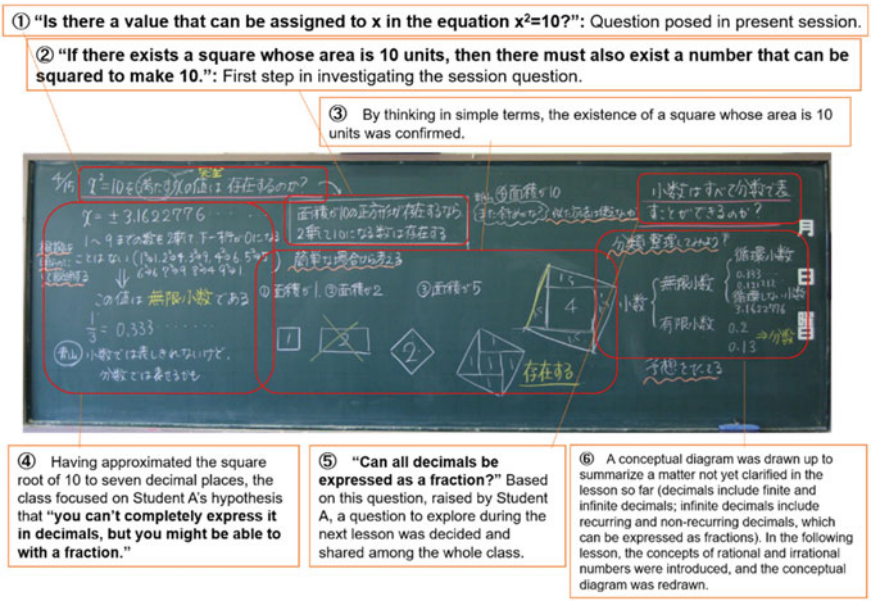

Fig. 8.6 Example of a Blackboard in a Mathematics Lesson for 3rd Grade Junior High School Students (*Source* Kazuyuki Kambara, a teacher at Shinonome Junior High School attached to Hiroshima University. The boxes within the figure and the annotations are by the author)

ing and causing them to internalize lessons. The use of blackboards and development of techniques for teaching note-taking in Japan clearly reveals the Japanese classroom culture, in which an hour-long class takes on the aspect of a drama program and emphasis is placed on acquiring knowledge and deepening understanding during each hour of class. Blackboard-writing and note-taking are tools for making possible such creative whole-class teaching. Moreover, the notes carefully describing the learning process function as student portfolios and an everyday mechanism for nurturing continued learning.

Furthermore, lesson plans in Japan often include mention of the learning and living conditions of certain "sample students" to whom teachers wish to pay particular attention. In particular, some teachers have proceeded by noting details about individual students on seating charts: How is their thinking progressing about the topic of a teaching unit? How is each student in the class expected to think or express themselves? And how do they think and express themselves? (see Fig. 8.7) Thus, it is not simply a matter of taking the entire class as a group—each student is viewed as rich in their understanding, making for a class that is creative throughout.

In this way, Japan's teachers cultivate their assessment abilities for student learning in the lesson process, and the abilities relevant to the emergence of new learning in response, through opportunities to reflect on what happens in the classroom and during the decision-making process in post-lesson review meetings. This also takes

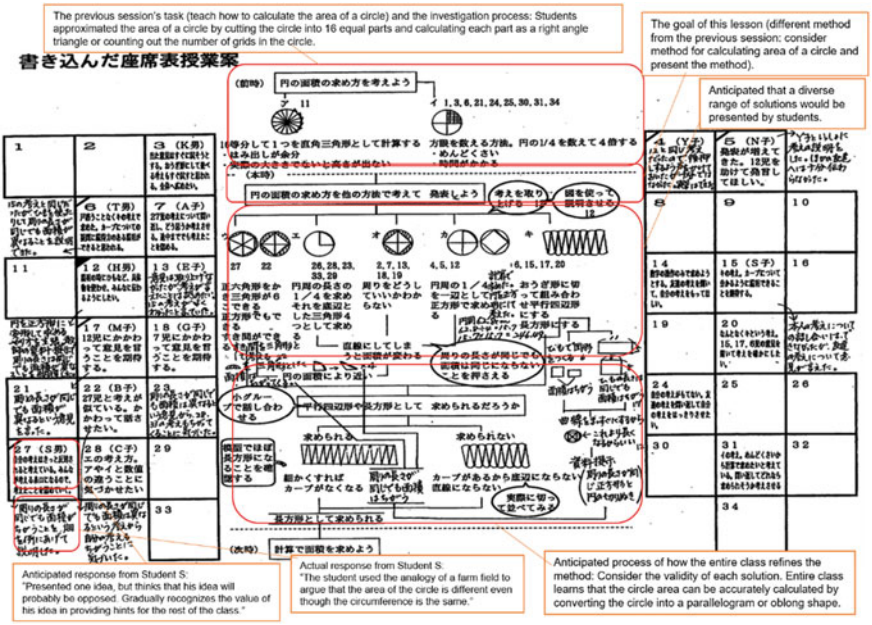

Fig. 8.7 Lesson Plan With Seating Chart (*Source* Kaoru Ueda, Ando Elementary School in Shizuoka City 1999, Ando shōhatsu ko o mitsumeru jyugyō [Ando Elementary School presentation: Lesson for discovering individuality], Meijitosho Shuppan Corporation, pp. 114–115. The boxes within the figure and the annotations are by this author)

place through opportunities to concretely imagine and envision pupil learning in the pre-lesson design stage. Therefore, because of the presence of the culture of teachers' practice research, a great deal of classroom assessment in Japan has not been a conscious application of tools but, instead, it has been inherent in the assessment abilities of teachers as a responsive art form, and has been implemented without being recognized as an assessment.

Conclusion

As put forward in this chapter, Japanese creative whole-class teaching that revolves around class-level activity, and especially the ideas of "teaching that builds on stumbles" and "stimulation", can provide clues for future assessment research when examined from the perspectives of assessment for learning and assessment as learning. If we strive to have assessment embedded in teaching and learning, formative assessment needs to be framed (1) not only as a closed reflective process but also as an open emergent process; and (2) not only as a visual and rational process whereby the teacher subject sees the student objects and tries to visualize their learning process,

but also as a sensual and aesthetic process whereby the teacher naturally develops a sensitivity in the responsive relationship between teacher and students. There is a need to redefine the concept of formative assessment as "responsive and emergent assessment".

To realize this responsive and emergent assessment in the classroom, it will be necessary for teachers to improve their assessment ability—the art of leading the students in creative dialogue. Starting with lesson study, the culture, systems, and tools accumulated by the practical research of Japanese teachers provide clues for how to train teachers who can actualize formative assessment in their classrooms. Conversely, through the formative assessment embedded in creative whole-class teaching, which visualizes the dialogic process between teacher and children while facilitating thinking and communication, the teachers are given opportunities to grow as they learn from the reality of the children's thinking and communication processes.

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