

The Secret of Akita:

The process of scaling up the unique Akita Brand to a prefectural-wide
practice over 70 years

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Abstract

The framework of “curriculum assessment as dialogue and ‘different things in different contexts’” could be demystified, reflecting the Japanese cultural pattern or prototype, by interpreting the attained curriculum as a kind of assessment that accumulates, rather than as a test score. Based on this hypothesis, the authors focused on Team Teaching (TT) in Akita, Japan, where it has been conducted for more than 55 years since 1964, and the TT protocol of a school that nurtured its own pedagogy and achieved unique cultural changes in Japan, which was presented as a document during the 1980s. The protocol also allows for a type of culture called “*Neriai*,” which incorporates different positions into a whole (a balance between acquisition and exploration; a potter’s wheel model and a *bonsai* model). Multi-layered assessment was suggested. New possibilities for the “*Ba*” method of visualization and the collective consciousness can be brought out by interpreting the meaning to respond to Catherine Lewis’ comments and expectations, a discussant at the WALs symposium. The “*Ba*” setting and collective consciousness are also recognized. There are two types of culture as the trump card, a peculiar social culture of craftsman (artisan) culture, namely “kneading” and “rooting.” The results suggest that there are knowledge creation practices in working the zone of proximal development (ZPD) collaboratively. The challenges in the future are to verify (1) whether it is related to deep learning in practice based on pedagogical leadership and cultural scripts and (2) how grade and subject sub-group members internalize a school research theme to reflect and express culture and identity.

Keywords: educational history, collective consciousness, Ba theory, cultural scripts, curriculum assessment, SBPLC (School-Based Professional Learning Community)

1. Introduction

Japanese Lesson Study has come under increasing attention from educators in the West and throughout South-East Asia since it was revealed outside Japan through the release of the TIMSS Video Study (Stigler et al 1999).

By extracting the attained curriculum as an assessment that should be accumulated, rather than as a test score, a framework of “curriculum assessment as a dialogue and different things in different contexts” reflecting the cultural pattern or prototype of Japan was completed. Based on this hypothesis, the author focused on Akita Team Teaching (TT), which has been conducted in Japan for 50 years, and the protocol of TT at a school that has nurtured its own pedagogy while achieving a unique cultural change in Japan, presented as a document during the 1980s.

“I appreciate that in your article on cultural perspectives on classroom assessment you noted that Japan has a history of undifferentiated and rote learning, but there was some effort in the 1980s and 1990s to move away from this. How successful has this been? What supported change?” (private correspondence from Janet Looney, 2017). This important research question was difficult to answer until coming across Van Gogh’s painting, *The Sower*.

It doubles as a radiant halo for the faceless figure. The sky is a startling color. A yellowish green with touches of pink. The setting sun is huge. It doubles as a radiant halo for the faceless figure. The little dots of seeds the sower is tossing are mixed with the colorful dashes that make up the land. It seems like Van Gogh is saying that the seeds and the earth are made of the same stuff. Van Gogh often talked about sowers as a metaphor for the creation of new life and growth.

(September, 2019 Van Gogh Museum, Amsterdam)

However, now the first author is certain that the current answer exists among the concluding remarks of the symposium in front of more than 300 retired principals, where Van Gogh’s sower was shown sowing seeds⁽¹⁾ on a big screen, saying “I am confident that the teachers will be able to create a narrative story for each person, taking advantage of the importance and usefulness of the lessons revealed in this survey.”⁽²⁾

This faceless figure— I would like to repeat this image for each Akita teacher here. It’s as if the seeds and the earth are made of the same thing. The birth and growth of new life— Seeds have become common goods (assets or properties) by connecting with people. And rain wets the

earth— It was raining equally so as not to hurt the roots such as ways of speaking and giving up (hanashi-kata, home-kata). Furthermore, the Parable of three kinds of medicinal herbs and two kinds of trees (Sanso-Nimoku- no-tatōe) in the chapter of the Parable of Medicinal Herbs (Yakuso-yuhon)⁽³⁾ is well known. Teachers in Akita have been enacting feedback, like rain, which should be gentle enough to nourish a person's growth without destroying the roots, whether they are excellent-good-poor or first-second-third (class) students as a medicinal herb, or of intellectually advanced-ordinary mind or physically big-small body developmentally as a tree.

"Feedback, like rain, should be gentle enough to nourish a person's growth without destroying the roots" This quote (modified from the original by Frank A. Clark) is a simple reminder that feedback can be helpful or not, assume a variety of forms, be provided at different times, and have diverse effects on different people. But what if there were a drought (no rain, no feedback)? Consider the following two questions: If a tree falls in the woods and nobody's around to hear it - does it make a noise? If a teacher instructs some content or skill and doesn't assess and support learning - can students deeply learn? In both cases, the answer is no."(Shute 2018).

The situation of a flood could be added from the Japanese case of excessive adaptation (*kaiyo tekiou*).

2. Practice first, research second

In the Showa 40s (1965–1974), the Akita Prefectural Board of Education guided students to improve their scholastic ability based on the fact that the learning subjects were children and thus emphasizing individual learning and nurturing an independent learning attitude. This “education direction” sought by Akita Prefecture and regarded as the main point of view, made it possible for many teachers to use the same vector in public study groups and research classes throughout the course.

At the time, “class masters” such as Kirara Hoshi were shining in each school and subject study group. It was called “XX people” to honor craftsmen who excelled in art such as scientists, Japanese speakers, and sculptors. They conducted joint research in team schools and team XX subjects in schools and subject research groups, offered proposal lessons, repeated research discussions, and improved their “teaching ability.” Like the shining stars gather together to form a constellation, the shining teachers gathered together, holding hands with their colleagues like a constellation and collaborating. They became a “learning organization (constellation)” that refines “power.”

(Toshihiko Sato, President of the Association of Retired Principals in Akita Prefecture)

2-1 In 2007, the Ministry of Education, Culture, Sports, Science and Technology's “National

Academic Ability and Learning Situation Survey,” conducted for the first time in 40 years, broke the news that Akita children and students had top academic results nationwide, which, of course, surprised the entire country. In addition, in the subsequent “Scholastic Ability Survey,” this achievement was maintained, and they continued to be the top class for 11 consecutive years until 2018. This achievement of Akita children was reported by the media and others to be genuine. The Akita Prefectural Board of Education embodies a good situation for children such as a successful subsidy program for small-group learning, family cooperation, and acquisition of favorable lifestyle habits such as home learning.

In such circumstances, “Akita Prefecture ranked first in the National Academic Examination (6th grade). Small classes, early sleep, and early preparations are well done at home. The lifestyle of children in Akita produced good results. They want to learn.”

There is another important reason for the great amount of attention, which is the fact that Akita Prefecture occupied the lowest place in the “National Survey of Academic Achievements (Extraction)” conducted by the Ministry of Education about 50 years ago (Showa 30s), which became a major issue in the “Student Struggle.” After half a century, news of the result of a leap to the top, a miracle, was amazing, and everyone wanted to know why.

If the Ministry of Education, Culture, Sports, Science and Technology’s measures (such as minority classes through a recruitment project) improve academic ability, academic ability should improve in any prefecture in the country. In such a “framework” comparison, the question of what causes disparity cannot be approached. I think it is important to have an analysis that focuses on “qualitative something in the classroom (class drama)” by children and teachers. Few organizations have attempted to explain the reasons for the grade improvement of Akita children in Akita education over 50 years. The memories and records of people who lived through this era can help to clarify and assemble Akita teachers’ “value training” (documented), so we came up with the idea that the Akita Retired Principals Association would be the most suitable group. Some members in their 80s were already teaching during the Showa 30s and would have suffered from the following teaching methods after being given the lowest evaluation. Furthermore, some members in their 70s had taken national achievement tests when they were children. Some had the mysterious feeling that children were at the lowest level, while teachers were first in the country. Those in their 60s had been working hard to maintain the top level after becoming first in the country. There were various demands by society at the time, but there is no doubt that we were doing our best for Akita’s children. Behind “the best children in the country” are “the best teachers in the country.” I thought that the “self-training for teachers to live in the future” can be achieved by analyzing the “self-training” that cultivated the teaching skills of the teachers by giving all the strengths of our retirement principals association.

2-2 It must not be forgotten that there were schoolteachers who worked hard for 10 years. The 1953 academic achievement survey was conducted by extracting 4 to 10% from elementary, middle, and high schools nationwide. In 1961, a survey of junior high school second and third graders was conducted. Enlarged. In the prefecture junior high school, the number of school tests and the time for supplementary training increased. At the time, there were teachers who strictly taught that “you are in competition until you enter the grave,” which inspired the motivation for supplementary training. On the other hand, there were teachers who encouraged children who were in a “giving-up” atmosphere, which is only possible in rural areas. Based on the results of the National Academic Ability Survey, in this prefecture, the “promotion of rural education” was eliminated, based on the reasoning that the academic achievement in rural areas, which account for 80% of the total number of schools in the prefecture, is based. It seems that they thought that there was no improvement in academic ability in this prefecture. However, it will take 10 years before the analysis of this topic can begin. A departure from the “experience-based education of the Showa 20s, interest in class practice based on systemism increased in the Showa 30s. It was the wish of all teachers, including principals, to recover from the shock of the “National Academic Achievement Survey.” The idea was to cultivate and improve solid academic ability through theoretically systematic instruction. “Program learning” has spread nationwide since the mid-1950s. In this prefecture, the Akita City Elementary / Junior High School Headquarters was established in 1963, and a “Program Learning Workshop” was formed on a prefectural scale. “I would like to promote research on program learning as an educational technology to develop human beings suitable for the new era, create a national connection, and contribute to the structural reform of educational technology,” said a presentation class (single-line program with Skinner method). About 300 people gathered for the first Akita Program Learning Research Conference, sponsored by the Prefectural Board of Education, Akita City Board of Education, and Prefectural Principals Board. The Akita Educational Research Institute was established in August 1955. According to “Akita Prefectural Education History,” the Ministry of Education started the “National Academic Ability Survey” in 1951, but the results of Akita Prefecture students were quite low. We conducted a questionnaire survey on scholastic ability improvement measures (extracting 10% of all prefecture elementary and junior high schools). As a result, while summarizing the “study results of scholastic ability improvement measures,” the answers to questions about “things that impede scholastic ability improvement” were published, including the following six points.

(1) Teachers have many miscellaneous tasks; (2) there are many events; (3) families are indifferent; (4) there is insufficient learning time for help at home; (5) there is no special classroom; and (6) there are many children / students per class. Based on these survey results, a “Guide to School

Education Guidance” was created and distributed.

As the students taking classes change every year, rather than repairing deficiencies in the subject areas of the children / students, it is important to train high-quality teachers who can always nurture high-quality children / students. It seems to have been convinced that it will not only improve but also ensure the education of the prefecture for the future.

In the “Improvement of Academic Ability” collections I (Showa 38,1963) to III (Showa 40, 1965), the direction indicated by the Prefectural Education Research Institute was recognized to have shown “great foresight.” In 1966, the year when the national scholastic ability survey was completed, the soul of this policy was further integrated.

2-3 The Prefectural Board of Education selected a research-designated school for “independent learning” and developed practical research. In 1965, the Prefectural Educational Research Institute published an elementary school arithmetic program sheet for 2nd and 3rd grade students and used it in each school. In 1975, a research article titled “A Consideration of How to Utilize Program Sheet Functions” conducted by the Akita Prefectural Education Center (established in 1969) and Educational Technology Laboratory was published. Teaching practice of reading comprehension learning is proposed. This is the time when so-called “sheet learning” is confirmed in Akita Prefecture. This period is said to be the “flowering period of lesson study” in this prefecture). Around this time, Bloom advocated “taxonomy of educational objectives” and “mastery learning” (1973), which influenced some Japanese scholars. Bloom’s theory explains “integration of teaching and evaluation,” whereby evaluation—diagnostic evaluation, formative evaluation, and overall evaluation—is utilized in teaching, and, for almost all learners, academic ability above a certain level is achieved. Bloom was well known as an advocate of mastery learning that can be guaranteed. Around 1975, in Akita Prefecture, target analysis workshops were held in various locations. However, creating a matrix for classifying targets and filling individual target cells was cumbersome and difficult. Therefore, there was little practice based on this theory.

In 1973, Eiichi Kajita translated and introduced Bloom’s *Handbook on Formative and Summative Evaluation of Student Learning (1971)*,” and the word “*jyoui*” (emotion, feelings, and volition from affective domains) gradually began to be used, in the words of Kajita. The number of schools that conduct research to make use of “*jyoui*” in learning has increased nationwide. For this reason, goal analysis (especially formative evaluation) and learning structuring theory spread widely, and educational technology such as flowcharts permeated instruction. Teaching that uses formative evaluation for future learning, inspiring the intellectual curiosity of children and students, nurturing a willingness to learn, and depending on individuality and ability is also important for

building reliable academic ability. This is accepted. Lessons that placed “*jyoui*” at the center of learning and allowed each child to enjoy the fun of learning fostered engaged learning in children. Many research-designated schools and open schools have proposed ingenious teaching that will motivate children to learn in open classes. The 1950s can be said to be an era when Akita Prefecture lesson study groups became very active.

2-4 In 1980, the Ministry of Education revised student records. The “Evaluation of Learning Status by Viewpoint” influenced by criterion referenced evaluation was newly introduced, and “evaluation of interest and attitude” was added for the first time. However, the Akita Prefectural Education Center said that “such evaluation methods represent a new field that had not been developed in education and research. To implement it, theoretical support and setting of specific evaluation criteria and evaluation methods were necessary. It must be “prepared,” and a project team was formed by gathering elementary and junior high school teachers (11 people) and supervisors (16 people) to establish the “Education Evaluation and Research Committee.” The “Procedure for Evaluation of Learning Status by Viewpoint (Theory)” and “Evaluation of Learning Status by Viewpoint (Practice)” were published in March 1983 and March 1984, respectively. These two volumes are referred to as the “Guidelines for Learning Status by Viewpoint.” Many of the ideas for picking up on emotional signs (symptoms) of children in class can be found in the “learning teaching examples” written by elementary and junior high school teachers: one that fills in the seating plan with a vector of attitudes of interest, or answers in a self-assessment column using the Likert method. In addition, some devices were devised to understand the emotional atmosphere based on the Semantic Differential (SD) Scale method. As for this project team, especially regarding the “evaluation of interest / attitude,” which has been thin in previous studies, “interest, interest and motivation support the ability to persistently pursue problems and are indispensable for academic ability.” It was based on the scholastic ability view. In addition, much research in this period (Showa 55 to 1989: 1980s) was concerned with how to develop children’s ability to learn by themselves (self-education / self-learning ability). Education based on valuing “feelings” focused on children’s willingness, to stimulate their intellectual curiosity and help them be able to learn to the end with their own strength. It is important to intentionally configure this process, which is the practice of “Akita-type inquiry learning” that was born in Akita. Evidence in the research bulletin of 1986 in Chikuzan Elementary School shows that, in Akita Prefecture, exploratory classes had already begun in the 1980s. Such exploratory learning was conducted in all prefectures, but it was still the public study group that was spreading it. During this period, in addition to the designated schools of the prefecture and county / city boards of education, research-disclosed classes were also frequently held under the commission of

private education research groups such as the Modern Education Research Group. In the latter half of the 2008s, there is a story that “Active Learning” advocated by the Ministry of Education, Culture, Sports, Science and Technology referred to Akita’s exploratory learning, as it was handed down from this era.

2-5 We should note the school as a “learning organization” in 1996–1997. As schooling progressed toward IT, teachers developed research based on a combination of knowledge and experience. Akita received a research designation on “improving teaching methods” from the Akita Prefectural Board of Education and the Akita City Board of Education from 1996 to 1997, and conducted practice based on TT at Municipal Sakura Elementary School. There were some schools in which TT did not lead to improvements in teaching methods, although additional teachers for improving teaching methods were assigned to base schools throughout the prefecture during the period. Meanwhile, Sakura Elementary School took the lead: “The leader is one step ahead.” The class leader took the initiative to analyze teaching materials, propose practical activities, and conduct class lessons through TT. Sakura Elementary School’s TT was a head-to-head study that inquired into what a child-centered teaching organization should be, keeping in mind the goodness and potential of children. The research theme was “Aiming at learning where individuals live,” and the sub-theme was “Improvement of learning guidance utilizing team teaching,” but the important question was, “How do you think about TT and how it should be practiced?” It was an attitude of “repair.” The following three points are commonly understood and commonly practiced.

- 1- As a teacher, I would like to be more involved and respond to the so-called diversity of children’s abilities, aptitudes, and interests. (TT depending on the individual)
- 2- I want to incorporate a lot of hands-on and concrete activities and further advance problem-solving learning to help children. (Promotion of exploratory learning)
- 3- Children inherently stumble, look back, move forward, and face challenges. I want to team up as a teacher and respond with all my strength to the learning process.

This activity was research that would center on the main path of education, with the desire of “raising the thoughts, wishes, and dreams of each child and cultivating their rich personalities and creativity.”

Sakura Elementary School’s practice appealed to the entire prefecture with its 2C3T type of instruction instead of fixed 1C2T. Proposing TT that is more flexible and has more potential than typical TT is a great achievement. The principal, principal, and chief researcher were also involved in the class, and the staff worked together in the staff room. He said that the research began to move gradually because he brought out the blackboard and discussed “what to do with

the timetable.” They added “enhancing teachers’ awareness and ability to create effective teaching methods for their purposes.” It seems that there was an organized learning purpose among Sakura Elementary School staff. It seems that he had repeated substantial training. It is a good practice that we can see that we practiced the best staff training in Akita Prefecture at this time. It had a positive impact on many schools within and outside the prefecture.

2-6 The fact that Akita schools jumped to the top of the national list for the first time in the 2007 survey greatly changed the situation of schools in the prefecture. Teachers from other prefectures who attended classes at schools in various places in Akita Prefecture and participated in academic achievement forums began to notice. In other words, no matter how many things you mention such as allocating business and small classes that are working all over the country, there is no reason to improve your academic ability. Rather, the “teacher’s stance,” that is “what type of children / students were asked for and what type of learning has been set,” is important. Therefore, it was understood that the secret of improving academic ability is to be found in the “drama in the classroom” developed by children and teachers. Teachers in Akita Prefecture have improved their skills (teaching ability) by improving classes and teacher training. To cultivate learning motivation, he emphasized “learning and nurturing instruction” that makes sense and promoted “learning activities that recognize individuality.” If, in the prefectures, one forces the restoration of poor parts based on the evaluation of the academic ability test, seeks equalization in the guidance of the children, and proceeds with the so-called “alignment guidance” for some time, “true learning” will disappear from the heart.

It is clear from previous surveys that “home study focusing on review” of Akita children has promoted the establishment of academic ability. There are many teachers who do not do homework among the teachers who have competed in class for quite some time. It represents the thinking and determination of the children and students for whom Akita teachers had a strong sense of responsibility. To that end, they made an effort to make all children understand the learning content in a one-hour class, and, by writing on the board and the notebook, the learning content is structured and recorded so that it will be remembered even after going home. This supports both the children who have intended to remember and those who have forgotten. With the early restoration after the unit test in mind, it seems that the formation of the habit of listening to self-residence learning after school and questioning time without any hesitation is taught by many teachers. It is. Some junior high schools set the week before the final exam as a “question week,” creating an atmosphere that makes it easy for teachers to ask questions.

However, in elementary school, home study is always checked by the teacher. In the morning, when you submit your home study notebook to your homeroom teacher, you will

receive a comment before you return home. The homeroom teacher sees all children's home learning and returns with comments. This is a difficult task for teachers, but it is a very good way to understand the actual situation of the child. Akita children grow up to be "motivated learners" through these home learning cycles, a favorable learning habit (atmosphere) that has been formed by serious students and teachers.

Thus, "Akita-type inquiry learning," which has been actively conducted since the late 1975s (late 1980s), has attracted attention. "Proactive, interactive, and deep learning," focusing on the problem-solving processes of children and students and assembling thoughts through discussion, is important. The keywords are sensibility, conception, image, creativity, rich expression, insight into self, and self-recognition. I think that we should reconsider what is said to be the "inquiry type" and consider class design from the perspective of "activation of thinking." Although only "partial academic ability" can be measured by a test, the strength of the children, students, and teachers in this prefecture, which has produced the top class for more than 10 consecutive years in the "National Academic Achievement Survey" will improve academic ability for the entrance exam. It is a result that emerges from raising children who live better, based on the goals of human education, which is essential for compulsory education and has proved the high educational achievement of this prefecture.

"Normalization of education," guided by Chuji Ito, a superintendent of education in the 1965s, is the foundation of all education and will be the foundation for supporting Akita Prefecture education in the future. In their 50-year history, Akita teachers who were under the guidance of the Akita Prefectural Board of Education and the Regional Board of Education enthusiastically engaged in joint research with respect for their peers. The "teaching ability" cultivated through this study has produced Akita children and students who are earnestly becoming "quality learners." The current challenge for Akita Prefecture is to reduce the number of schools and teachers (mass retirement era), as the number of children will be declining in the future. It is to keep it as a property and maintain it. With awareness of the "Akita brand," the efforts of the prefecture's teachers to date should be appreciated.

3. Discussion

The ideas of cultural scripts appear in our minds to make "tacit knowledge" visible from the subconscious. Several cultural scripts can be found behind the scenes, as described below by Hamada.

***Kata* scripts**

The TT of Chikuzan Elementary School has changed in response to the educational issues of the

times. Therefore, TT is kata, but it is not fixed. In this case, kata means tacit knowledge (skill and soul) of an educated craftsman that has been inherited and developed.

***Nemawashi* scripts**

The principal will make prior arrangements (*nemawashi*) with all faculty and staff members when establishing the TT guidance system. The key to TT success depends on faculty's awareness of participation and motivation.

***Kaizen* scripts**

TT started with teaching by two teachers in one class and changed to class-wide teaching beyond the class and to improving curriculum and teaching methods throughout the school. TT planning promotes the formation and sharing of teachers' criteria and enables collaborative assessment of teaching content and methods. This contributes to teacher capacity building and curriculum improvement.

***Hansei / kaizen* scripts**

The practice of TT promotes sharing of criteria among teachers and children and enables frequent assessments between teachers and children and children. This enhances children's willingness to learn and contributes to the development of self-regulation ability. The evaluation and improvement of TT will enable class improvement and joint curriculum development from a long-term perspective.

***Kizuna* scripts**

Chikuzan Elementary School TT consists of three forms of cooperation (*kizuna*). The first is cooperation between the chief researcher and principal (*kizuna*). The research subject is based on the principal's "management policy," but the final decision is a result of a teachers' "consensus." A series of lesson studies are sponsored by the chief researcher, and the principal supports it. The second is cooperation among teachers (*kizuna*). Classes are planned and conducted mainly by grade-level teachers. The results will be verified and shared through the in-school lesson study group. The third is cooperation among past and future teachers (*kizuna*). Practical knowledge from past lessons is dug up and utilized around the study room and passed on to the next generation.

Sustainable Lesson Study

If we look at the history of research at Chikuzan Elementary School, we find a consistent research attitude, which is, "Sit beside and learn from the children." Chikuzan Elementary School has optimized its teaching methods, curriculum, and education management by focusing on the "facts of children's learning." It will be the driving force of TT over the next 50 years.

4. Conclusion

Based on the survey (see Appendix 2), we can elicit a balance between acquisition and exploration, which is unique, and the scaling up in Akita: a *Rokuro* (a potter's wheel) model and a *Bonsai* (a dwarf miniature potted tree) model in craftsmanship or artisanship in dual thinking, balancing “from the inside” and “from the outside.” The “from the inside” model is the equivalent of constructivism, a learning theory found in psychology that may explain how people acquire knowledge and learn and can therefore be directly applied to education. The theory suggests that humans construct knowledge and meaning from their experiences, that learning is an active process, and that people gain knowledge and understanding from a combination of experiences and ideas. Constructivist learning environments emphasize authentic tasks in a meaningful context, rather than abstract instruction out of context. It also provides learning environments such as real-world settings or case-based learning instead of predetermined sequences of instruction. The “from the outside” model is the equivalent of behaviorism, a learning theory that focuses only on objectively observable behaviors and discounts any independent activities of the mind. Behaviorists define learning as nothing more than the acquisition of new behavior based on environmental conditions. In addition, the protocol (see Appendix 3) allows for a type of culture called “*Neriai*,” which incorporates different positions into a whole (a balance between acquisition and exploration; a potter's wheel *rokuro* model and a *bonsai* model). It has been suggested that there be multi-layered assessment. New possibilities of the method of visualizing the setting of the “*Ba*” (Ide 2018; Nonaka et al 1998; Ohtsuka n.d.; and Shimizu 2014; Hanks et al 2019) the collective consciousness can be extracted by interpreting the meaning to respond to the comments and expectations of Catherine Lewis, a discussant at the WALS symposium, “*Ba*” setting and collective consciousness were also recognized. There are two types of culture representing the trump card of the social culture peculiar to craftsman culture, namely “kneading” and “rooting.” The results suggest that there is knowledge creation practice in the working zone of proximal development (ZPD). The challenge in the future is to verify (1) whether it is related to deep learning in practice based on pedagogical leadership and cultural scripts and (2) how grade and subject sub-group members internalize a school research theme to reflect and express a culture and identity.

Notes

- 1) The following phrase continues. “*This thinking was already there in his early stock paintings of peasant farmers. His character through here in brilliant colors. Van Gogh summed up his thinking about color in one wonderful sweeping sentence about this very painting: ‘I couldn’t care less what the colors are, in reality.’*” And that’s part of Van Gogh’s great

accomplishment, a way of looking in order to free himself from what is literally in front of him. By the end of his life, he achieved his goal. He did find an entirely new unique way of painting that showed us the beauty in the everyday. By coming to the museum today, you helped him achieve another goal he had. Really. Listen. 'I still hope not to work for myself alone.'"

- (2) The Akita Retired Principals Association celebrated its 50th Anniversary on 12th October 2019. To commemorate the occasion, we decided to produce a "commemorative magazine." The 50 years since the formation of the Showa era in 44 years, the "Scholastic Ability Survey of Heisei" from the age when the "Escape from the lowest level" began to appear soon after the "Showa Academic Ability Survey" ended. It has been a fierce 50 years to make this leap to become the top class in the country. Akita's teachers, whose efforts for half a century have been voluntary, are not able to put together their "recording skills" and "memory" within the certainty of our "records" and "memory." There are no great achievements. Exploring Akita teachers' "individual training," which supported the period of breakthroughs among Akita's children and produced a visual record is significant. While the "Scholastic ability survey" presents a one-sided understanding of academic ability, the evaluation of Akita teachers increased based on the great progress of their students. At the same time, "Akita Education" became a brand. In the future, we will continue to lead the concept of active learning as "Akita-type inquiry learning." This draft is deeply indebted to the Akita Retired Principals Association's 50th Anniversary, especially Mr. Toshihiko Sato.
- (3) This is from the Lotus Sutra (Saddharma-pundarika sutra), one of the most important sutras in Mahayana Buddhism and likely written down between 100 B.C. and 200 A.D. Already well known in India, the Sutra became more famous and influential.

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The Lesson Study Group at Mills College <https://lessonresearch.net/>

International Math-teacher Professionalization Using Lesson Study; IMPULS) at Tokyo Gakugei University <http://www.impuls-tgu.org/en/resource/>

Appendix 1

Comment by Catherine Lewis at the Amsterdam Symposium

Thank you so much for your very interesting presentations.

I want to say, first of all, that it is wonderful to hear from very experienced Japanese classroom educators: classroom teachers, head teachers, principals, with experience. There is a wealth of knowledge that we so rarely get a chance to look at outside of Japan, so I really appreciate that. Of course, from Mr. Arimoto, his extensive experience adds to Japanese national educational history.

So, I want to start with Mr. Hamada. So, questions of what will be sustained, how can good practices be spread, what are the organizational structures and practices that led teachers to become middle leaders— that's something I would like all three speakers to talk about. It seems to be an exceptionally useful system, not just for bringing in children's ideas and not only for creating education for children but also for creating leaders, so that teachers become middle-level leaders. I would really like to hear more about that— the idea that, rather than teachers managing their own classrooms, they are managing a whole grade level together. And that those whole grade levels are working across the school, and I think that is also a very helpful idea. There is not as much

evidence in the United States, the idea that you think, not just about the specifics of each classroom but about the whole grade. I once asked a Japanese pre-school director to illustrate for me why you do lesson study in pre-school, and being a principal director I guess you like talking about pictures rather than words. So, he painted me a picture of two parents, each with their children holding their little fingers, bringing them to school. The children arrived at pre-school, and in the pre-school, there was a teacher with 35 years of experience, who was very good at teaching, art, science. In the classroom next door, there was a teacher doing her first year of teaching at the pre-school, who said, "If you were a parent, how would you feel if your child received 35 years of wonderful experience in one year of experience? We want all children to come to the school to get the benefits of that teacher who knows how to teach math, music, art, and science. So, that was the principal's explanation of why they did lesson study in pre-school, and I feel like I am hearing something similar here. It is not just about classes for the grade level, and teacher teaching is a good way to make that happen in school.

I also thought Ms. Yamamoto's experience of lesson study was really powerful. I hear that from Japanese teachers. Lesson study is a great topic that people around the world are listening to. My friend who is a teacher would say, "Well, sometimes, it is really good, but sometimes, it just has nothing to do with becoming a better teacher. It has nothing to do with serving the children better. I feel powerless. I focus on things that are interesting to me." So, I really appreciate those voices being heard, too. So, I would also like to hear more about that. I've been developing something that's really connective to make things better for children. The idea that team teaching has lasted in Chikuzan Elementary for 55 years—we need to hear more about that, about the factors and the focus on children being the reason things continued. We need to hear more about why it continued for so long.

That a flexible number of children in a group use the class but also the whole grade level, depending on what you are doing, is also an interesting idea, I think... the idea that when principals come to the school, the teachers explain the research focus. The teachers show ownership and agency there, which is something very profound for a lot of Western countries. Because the teachers own this research, they're helping to recruit principals to work at the school. The idea that the most important thing are the teachers' questions... I'd really like to hear more about that, also, and the idea that you use team teaching as an advantage here. I found these comments from Mr. Arimoto very interesting. Practice first, research second. It's about making practice better, not simply doing research for researchers. There is a tendency in some US lesson study to think that you should have a lesson plan because that's how you're going to learn, whether the research plan

works or not. By contrast, Japanese teachers often say things like, "You do all the planning... you can very, very carefully plan a lesson, but when you get into the classroom, you throw out the lesson plan and teach while looking into the students' eyes." It reminded me that it's about always having children's learning needs in mind: practice first and research second.

I would also like to hear more about the news of how the school changed its ways of working. You don't get stuck in a fixed way of working. I think we were introduced by Mr. Arimoto to a lot of interesting Japanese ideas and why lesson study, this idea, is proven, even if it contrasts with the American idea. Interestingly, the Japanese word, "nemawashi," which when you translate it, teachers talk about children's "Kodawari." Look in the dictionary; I think it means "obsession," which is a bad word in English, since we don't try to value children's obsessions. But the Japanese teacher would, for example, notice that children have different ways of getting to work on a task. Some are obsessed with a mathematical idea they met at work, or maybe an art project is better. Your real motivation to work will be treasured. So, I think we are seeing the same thing applying to lesson study here. The idea is that however good things are, they can always be better.

I think that is inherently where they got the idea that was introduced concerning Nemawashi, that you always think about what to do better. Similarly, I think the Nemawashi idea of binding, I think it comes from transplanting plants. If you are going to make a transplant successfully, you must carefully grab the whole corf, even the tiniest roots, and then you are able to lift and move the whole thing to a new place. So, before you try to do something as a whole school, you should really understand where everyone is, what everyone is feeling. How could we bring the entire school alone? And I think it's also important to pick up ideas.

I once questioned a Japanese teacher about why the children were very bad at doing lessons, based on the children who were actually showing them. She replied with a very interesting response that I want everyone in the class to applaud. She said that if a teacher gives up on a child, he will be lost to schooling. It reminds me how hard it is to be really bad in Japanese elementary school, because the teachers are persistently interested in helping students to connect with other children and don't want them to give up them.

About a month after I made that observation, I was back at home in my US school, where my child was in first grade. He came home one day and said, "I can't invite Evan to my birthday party." I replied, "All the birthday party invitations have already been mailed." He repeated, "I can't invite him." So, I said, "He is your best friend; why can't you invite him?" He said that

Evan got his name on the board. His first-grade teacher was putting names on the board when a child did something wrong. So, I flashed back to the Japanese teacher I mentioned.

So, I like the idea that you can have a pattern, a way of doing things that's fixed but that it can also be flexible. Team teaching was a fixed kind of system but it could change elements. So, how do you know what elements to change during lesson study? There is a certain purpose needed there to change elements. So, understanding of a long-term purpose is very important. I thought about what has been constant over the 50 years, besides the children's learning; the idea of an elementary school that has published 15 books of its work and has so many open lessons; the idea of going from theory to practice—I'm sorry, from practice to theory—in a very American way. And the idea of going back and forth for self-study and group study, so they take works on big take-aways for me that are the energy of never to ignore of children that keep the system sustainable. And the idea of circulating widely documents that bring to life students' experiences so that other teachers can see how those ideas and feelings suit experience as well.

Sorry for speaking so long about today's very inspiring presentation. Thank you.

Appendix 2

The survey was conducted of 1,858 teachers (sampling of 17.7%) in 2017 by the Akita Retired Principals Association.

Q1 In your class practice, what do you value and how important is the concept of content / methods and specific instructional situations?

1 Establishment and proficiency of basic and basic learning content through repetition and practice.

2 Ingenuity of learning activities such as training using existing learning content

3 Learning to embody, generalize, and abstract by thinking about solving problems

4 Teaching styles for groups, small groups, etc. according to various learning situations

5 Guidance on raising children with insufficient achievement

6 Guidance on further raising children with sufficient achievement

7 Setting up opportunities for learning and teaching among children

8 Creating and utilizing learning guides and hand pucks

9 Notes on instruction to make you aware of your learning status, achievements, tripping, and growth

10 Questions / instructions such as useless, focusing on learning activities

11 How to speak / listen to increase learning efficiency and motivation

12 Guidance on desirable learning methods and rules for classes

13 *Confirmation of learning outcomes and challenges with children while utilizing evaluation criteria and standards*

14 *Raise awareness of learning and improve learning outcomes by showing children specific evaluations at each learning stage*

15 *Creation of a study instruction plan to ensure class assembly*

Q2 *What do you think has been useful as a place or opportunity to improve your own "leadership" so far?*

1. *Academic ability and learning status surveys by national, prefectural, and municipal committees*

2 *Designated training, specialized training, voluntary training, etc. by prefectures and municipalities*

3 *Guidance for school visits based on prefectural and municipal boards of education or requests from schools*

4 *In-school lesson workshops and guidance methods*

5 *Various conferences such as school grade groups and subject groups*

6 *Daily dialogues and consultations with seniors and cohabitation*

7 *Guidance and advice from managers and chief researchers*

8 *Comments and questionnaires from children, parents, etc.*

9 *Activities at educational research groups in prefectures and districts*

10 *Public research presentations at other schools and educational institutions*

11 *Self-study with educational books and circle activities*

Appendix 3 Protocol (the mathematics class of grade 4 about "let's find the device by which a change is easy to see in the graph at Chikuzan elementary school dated on 5 June 2017)

T1 *Let's start the lesson.*

T1 *Okay.*

T1 *In grade 4, we all learned about something called the line graph and,*

T1 *now that we have learned it, we now know how to draw both the bar graph and the line graph.*

T1 *I think we are all good with the line graph now.*

T1 *Well then. Today, we have a few fellow classmates who took measurement of their hamsters.*

T1 *Day 1, 35 grams. Day 2, Day 3, Day 4.*

T1 *We want to be able to access this information easily by representing it with a graph.*

- T1 *Would a bar graph do?*
- T1 *Would a line graph do? Which one would do?*
- S *A line graph will do.*
- T1 *Why is that?*
- S *It's because of time.*
- T1 *What about time?*
- S *The hamsters' weights change as time goes forward.*
- T1 *The hamsters' weights change with time.*
- T1 *As time moves forward, weights change, as well.*
- T1 *I would like you all to represent it using a line graph, do you think you can do it?*
- T1 *Yes.*
- T1 *Well then, now I'm going to hand out some graph papers.*
- T1 *There is an "㊦ (a)" written on each of these graph papers.*
- T1 *Please write on this one.*
- T1 *Next, glue the paper.*
- T1 *Make sure you glue the side with the "㊦ (a)" written on it.*
- T1 *Ok. When you are done gluing, please start marking on the graph.*
- T1 *The X axis has already been marked for you, so that's easy.*
- T1 *You are supposed to mark the hamsters' weights on the Y axis, but how do you go about figuring out the scales?*
- T1
- T1 *Now that's difficult.*
- T1 *What did you mark for the thick line that comes first?*
- S *10*
- T1 *Great, 10, 20, 30, and 40.*
- T1 *Are we good to go?*
- T1 *Do you guys think you can do it?*
- T1 *Alright, let's give it a try.*
- S *10, 20, 30, and 40.*
- T1 *35 grams.*
- T1 *What is this one tiny scale for?*
- S *This is for 2 grams.*
- T1 *Yes, for 2 grams.*

- T1 Are we all done drawing the line graph?*
- T1 35 grams, 35 grams, 34 grams, 34 grams, 35 grams, 36 grams, 38 grams.*
- T1 Are you done?*
- S Yes, done.*
- T1 Looks like we won't be having much trouble with marking scales here.*
- T1 You guys gave quite some thoughts about marking scales!*
- T1 Does your graph look like this?*
- S You got it. Yes, it looks like this.*
- T1 Is it correct? Good job!*
- T1 Why are you so nervous.*
- T1 Everyone has got the same graph drawn.*
- T1 During the 7 days you measured the hamsters, on which days did the hamsters' weights go down?*
- S The 3rd day. 4th day. 6th day.*
- T1 On which days did the hamsters' weights stay unchanged?*
- S The 1st day, and 2nd day. And the 3rd day.*
- T1 Let's have someone present his or her graph for us.*
- T1 **On which days did the hamsters' weights stay unchanged?***
- T1 **Let's see... Itsuki.***
- Itsuki **Yes. The hamsters' weights stay unchanged on the 1st day and the 2nd day, I think.***
- T1 **What does everyone think?***
- S **Great.***
- T1 **Is it ok?***
- T1 **Let's have Taiyo present his/ her graph now.***
- Taiyo **Yes. The hamsters' weights stay unchanged on the 3rd and 4th day, as well.***
- T1 **What does everyone think?***
- S **We got the same result.***
- T1 **Everyone got the same result?***
- T1 **Great. When, then, did the hamsters' weights change the most?***
- T1 **Let's have Manami present her result.***
- Manami **I think it changed the most in between the 6th and the 7th day.***
- S **We got the same.***

- T1 *Good job. You guys can now draw and interpret the line graph!*
- T1 *But it's a bit hard to see, right?*
- T1 *It's kind of hard to see how the line goes up, right?*
- T1 *But as long as you guys can draw the graph, then it's all good.
Everyone is ok, right?*
- T2 *No, Ms. T1. The way I drew my graph makes it a little bit difficult to see.*
- T2 *I draw mine this way, how about everyone else?*
- S *It's good.*
- T1 *Ms. Konno, isn't this a different hamster?*
- T2 *No, it's the same one. Look at the graph.*
- S *35 grams. 35 grams.*
- T2 *Correct?*
- S *Correct.*
- T1 *Looking at the graph, where would you say the inclination changes most drastically?*
- T1 *Ikuto.*
- Ikuto *The inclination changes most drastically from the 5th to the 7th day.*
- T1 *Is here steeper or here? What about the 6th and the 7th day? Are the hamsters' weights going up?*
- Ikuto *The 7th day.*
- T1 *What about here? How does the inclination change from the 6th to the 7th day?*
- T1 *It gets really steep here.*
- T1 *What does everyone think of Ms. Konno's graph?*
- S *It's so easy to follow.*
- T1 *It's easy to follow? How so, though?*
- T1 *Everyone says "it's easy to follow", but exactly what makes it so?*
- T1 *Let's think about it for a second.*
- T1 *Alright. So. Let's write down today's objective.*
- T1 *Let's try to write at the same pace Ms. Konno does. Here we go.*
- T1 *"Figure out how to draw graphs in a way that it would be easy to observe changes".*
- T1 *If you got it figured out, don't hesitate to let me know.*
- T1 *Is everyone good?*

- T1* *Let's put down our pencils for now.*
- T1* *We will set aside some time to write ●.*
- T1* *So here we go. Listen up. Raise your hand if you got it figured out.*
Great. Kookai, let's see what you've got.
- Kookai* *Alright, so I am not sure, but Ms. Konno see each scale line as 1, skipping 10, 15, and 20 altogether.*
- T1* *Correct. I skipped 5, 10, 15, and 20.*
- Kookai* *And then, again I am not sure, but I don't think it's necessary to write the 10 and the 15 at the very beginning.*
- Kookai*
- Kookai* *Does anyone have something similar to this?*
Kookai, take a guess.
- Kookai* *Let's have Honoka share her thoughts.*
- Honoka* *Ms. Konno skipped 5, 10, 15, and 20 using the wave sign, starting right from 30. This way, the line starts right from 30, and since the first point we are interested in is only 4 scales away from 30, so I think it's really easy to follow.*
- S* *Same.*
- T1* *Does anyone have something similar to this? Honoka, take a guess.*
- Honoka* *Let's have Mizuki share his thoughts.*
- Mizuki* *I have the same thoughts as Honoka's. I noticed the wave sign that Honoka also noticed.*
- T1* *I see. So you also noticed that.*
- T1* *Raise your hand if you noticed it as well.*
- T1* *Did you notice? Looks like we have quite a few.*
- T1* *You can put your hands down now.*
- T1* *So you all know that the wave sign helps us skip.*
- T1* *What other techniques are being used here?*
- T1* *Mizuki, take a guess.*
- Mizuki* *Let's have Shouhei share his thoughts.*
- Shouhei* *Yes.*
- T1* *It sounds great.*

- Shouhei* *I don't know if it's correct.*
- T1* *That's fine.*
- Shouhei* *The graph is right in the middle, and so it is easy to read.*
- T1* *It's not drawn high up there, but right in the middle where it's easy to read.*
- T1* *Let's have Miyuki share her thoughts with us.*
- Miyuki* *Just adding to what Kookai comment. I don't think it's necessary to write any numbers below 30, because the hamsters' weights starts from 30 and goes up from there.*
- T1* *So, we just need numbers that are above 30.*
- T1* *Let's have Sakutarou share his thoughts.*
- Sakutarou* *My thoughts are more or less the same as Itsuki's. He/ she said that it's better to just write numbers above 30, and omit everything below 30. However, I personally think that having 0 is great.*
- T1* *This is important. Speaking of which, same here. I have 0, as well.*
- T1* *Looks like quite a few of us have noticed that the scales have been omitted.*
- T1* *How many grams does each scale represent?*
- T1* *1 gram.*
- T1* *Correct, 1 gram. Each scale stands for 1 gram.*
- T1* *Does anyone have a different take on this?*
- T1* *Haruka, your turn.*
- Haruka* *Yes. By representing 1 gram with 1 scale, it's easy to observe how the steepness of the inclination changes.*
- T1* *Great. It's easy to observe how the steepness of the inclination changes because 1 scale stands for 1 gram.*
- T1* *Does anyone have anything else to say? Is everyone ok?*
- T1* *Alright then, Ms. Konno, what do you have to say?*
- T2* *Thank you so much. This is a great class! That's right.*
- T2* *I represent 1 gram with 1 scale, just so that the change of the inclination would be a lot more obvious.*
- T2* *All hamsters are above 30 grams, correct?*
- T2* *That's why I wrote it in bigger letters here.*
- T2* *This is fascinating, right? But we can't start right from here. Since 0 is important, we need to have it written too.*

- T2 *Well done for pointing that out, Sakutarou.*
- T2 *And then here we have the wave sign that all of us have noticed, which saved us the pain of having to write the numbers in between.*
- T2 *Good job guys!*
- T1 *We are trying to represent 1 gram using 1 scale here, so what happened was that some of us tried to mark 5, 10, and 15 to start with, right?*
- T1 *And what would happen if you try to do that?*
- T1 *There wouldn't be enough space, right?*
- T1 *5, 10, 15, 20, 25, 30, 35. This is what would happen.*
- T1 *So yea, we are just going to save ourselves some work here.*
- T1 *This is how it's done, alright?*
- T1 *And since we saved ourselves some work and space here, more space will be made available on your graph paper. It's now ok to represent 1 gram using 1 scale.*
- T1 *I see. Let's give this method a shot, then!*
- T1 *Let's try to write on the side with an "∪" (i)" written on it.*
- T1 *Here comes the super duper important wave sign.*
- T1 *If you look at it up close, the wave sign looks like this.*
- T1 *If you draw your wave sign like this, they will have the same width.*
- T1 *Draw it as you would a river. Is everyone done?*
- T1 *And then mark "30" on the next scale.*
- T1 *Kookai said, "it's not necessary to write anything below 30", but Honoka said, "simply omitting everything below 30 won't do. You need to have the wave sign".*
- T1 *The wave sign is super important. Let's try to draw it.*
- T1 *How does your graph look?*
- T1 *For those who finished drawing, think about what your peers just said, and write down anything that made you go "so that's how it is!"*
- T1 *Good job! You did it all by yourself.*
- T1 *So yea, it is ● to just omit all the scales that we are not using.*
- T1 *Great, now let's try to break your all down into groups and have you gather around tables, and check for one another whether your graphs are correct.*
- T1 *If something about your peer's graph is off, remember to leave a comment.*
- T1 *Ok then, let's get to work.*
- T1 *Alright, let's call it a stop here.*
- Let's write this down on the next page in your notebook.*

- T1 *Here we go. First.*
- T1 *The wave sign helps make the line graph reader-friendly.*
- T1 *It takes about 2 blocks to draw the wave sign.*
- T1 *By using the wave sign, it's ok to omit all scales in between.*
- T1 *Now, let's try to circle with red.*
- T1 *A ● that says, "it's ok to use the wave sign so that I can make the graph easier for myself to understand"*
- T1 *The take-home message is this: how do we make it so that we can make our graphs easier to understand?*
- T1 *A very important factor is how the scales are marked, right?*
- T1 *Let's give that a try.*
- T1 *We are going to the Integrated Environment Center in Akita City for our field trip next week. I've studied a little bit about garbage on the Internet ? specifically, the amount of garbage produced by one person per day in each family in Akita City.*
- T1 *It's only an estimate. I've checked the specific amount, and it's written on the Internet.*
- T1 *I will be handing out the result now.*
- T1 *According to what it says on the Internet, approximately 500 grams' worth of garbage is produced by one person on a daily basis.*
- T1 *Let's keep in mind that this is from Heisei 23 (2011). It says that in 2011, the amount per person was 580 grams.*
- T1 *570 grams for Heisei 24 (2012)*
- T1 *530 grams for Heisei 25 (2013)*
- T1 *And then here we are in Heisei 29 (2017). We are only halfway through the year, but all the information up until Heisei 28 (2016) is on the Internet.*
- T1 *It can all be found on the Internet, and I've tried to represent it with a graph in a way that it's reader-friendly. Now, I would like all of us to give it a shot.*
- T1 *Can you guys do it?*
- T1 *Yes.*
- T1 *It's the same as the graph on the hamsters that we've just drawn. Are we all good with it?*
- T1 *Yes.*
- T1 *All good? The X axis is different now. For the Y axis, can we make it so that it's*

easy to do?

T1 We can have a group discussion and try to figure that out.

T1 Alright, I can see that everyone's discussing now, but I'm that I am going to have to stop you guys here.

T1 Let's check out the board.

T1 Let's see how the scales are being marked here.

T1 How is it done? What technique was used?

T1 It doesn't go by 1, 2, 3, 4, 5, right?

T1 How did I do it, then? Honoka, go ahead. What number did you write here?

T1 500

T1 500. Is that right?

T1 Yes.

T1 Anyone else with the same answer? 500. Great.

T1 You may put your hands down.

T1 So you started from 500, right? Let's have Rai share his/ her thoughts. Please look at Honoka in her face.

T1 Did she get her message across? Do you have the same answer?

T1 Let's have Rai speak for us. Honoka, please remain standing.

T1 Let's hear what Rai has to say. What does it say here?

T1 550

T1 I have the same thing.

T1 Does it seem to be correct?

T1 Yes. Please sit down.

T1 500, 550. How about here?

T1 600

T1 600. Great, then 500, 550, 600.

T1 How about here? We need the wave sign here.

T1 Can we all do it?

T1 Let's have a group discussion.

T1 Great, now let's cross check.

T1 Attention. Good pose there.

T1 Now, Heisei 23 (2011) is 580. In this graph, how many grams does one scale represent?

T1 10

T1 10, right?

- T1 *580. Next, Heisei 24 (2012) is 570, 530, 530, 520, 510.*
- T1 *Did you guys notice anything?*
- T1 *Looking at these line graphs, did anyone notice anything?*
- T1 *Sakutaro, let's hear you speak.*
- Sakutaro *Yes.*
- T1 *Hold this if you are looking at it.*
- Sakutaro *The amount of garbage went down from Heisei 24 (2012) to Heisei 25 (2013). I think this is because the cost of garbage bags went up.*
- S *Same here.*
- T1 *And so you think that this might be when the change happened, right? I see.*
- T1 *We can make a prediction but we can't tell what the answer is for sure.*
- T1 *Here, the inclination is very steep, and the change is quite drastic, right?*
- T1 *I would like to try to find out why it is through the Internet, and also try to ask about it during our field trip.*
- T1 *Alright then, so, we learned about the line graph today.*
- T1 *We've all been able to draw it just fine until now, but what we did just now was learning how to draw it so that it would be more reader-friendly.*
- T1 *By the way, if we do this every time we go up by 100 grams, 100, 200, 300, 400, then it would look like this.*
- S *Long.*
- T1 *So yea, I think it was great that we learned about "saving" today.*
- T1 *Before we call it a day, let's try to reflect upon what we have learned and write down our thoughts.*
- S *What do we do with this? Are we supposed to glue it?*
- T1 *I am going to collect the graph papers later. For now, let's go back to the notebook.*
- T1 *Alright. We are going to call it a day when you hit the circle.*
- T1 *We are going to do the class greetings. After that, I would like you stick your graph paper into your notebook and submit it to me.*
- T1 *The student on duty for today, please collect everyone's work for me.*
- T1 *Take care. The second lesson of the day is now over.*
- T1 *Yes.*

