

## Improving Elementary Science Lessons through School-Wide Lesson Study in Japan

Sachiko Tosa  
Niigata University

In the Course of Study fully implemented in elementary schools in 2020 in Japan, students' collaborative, active, and deep learning is emphasized as the key idea for teaching to help students acquire competencies in this rapidly changing world. In science, the Course of Study also emphasized the importance of student inquiry in the process of learning the mechanism of natural phenomena. However, in elementary schools, teachers usually have to teach all the subjects regardless of their specialty. Many teachers are feeling less adequate in teaching science and there is a strong need to establish a system for helping such teachers.

In this research study, the effectiveness and impact of a school-wide lesson study which took place for improving elementary science lessons is examined. The lesson study activities in School A began by the initiative of the principal of the school. School A was newly established in a city in 2020 in order to solve the overcapacity problem of School B. The building of School A was newly built, and half of the 25 teachers came from School B and the rest of the teachers came from different schools. Many of the teachers are still in 20s and less experienced. A total of 7 teachers, including teachers from each grade, a head teacher for educational research, and the principal, participated in the lesson study group. The lesson study activities were held in a cyclic manner as the planning, implementing, and debriefing sessions consist of one cycle. As shown in Table 1, the

planning session took place first just like lesson study in the US, followed by the implementation and debriefing session.

Through the 5 cycles, teachers' teaching was measured by the instrument called Reformed Teaching Observation Protocol (RTOP) by Piburn & Sawada (2000)\*. Change in teachers' attitudes

toward teaching and collaboration was measured through a 25-item questionnaire administered in the beginning and end of the lesson study activity period of the year.

Observation data indicate that the questionings and student activities that were revised through the discussions in the planning session often promoted students' active learning and construction of scientific ideas in more meaningful ways. For example, in the lesson of the lever in the second cycle, the teacher proposed a lesson idea of student free exploration to find a rule for making the lever balanced when both the weight and position are different on the left and right arms. However, through the discussion in the planning session, the team realized that students would not be able to find the rule when the question is too open. They decided to fix the weight and position on the left arm of the lever instead of the free exploration activity.

Survey data indicate that many teachers were concerned with the lack of time for instruction and their inability for helping student thinking. However, through lesson study they realized more strongly the importance of discussions among their colleagues. Some of the teachers also mentioned the importance of acquiring correct scientific knowledge by themselves so that they would be more confident and able to help students conduct deeper inquiry. It seems that the change in teachers' attitudes toward teaching and collaboration just started to happen.

The lesson study activities at School A will be expanded with more teachers involved in the next school year. It is expected that teachers' learning about teaching and collaboration will become at the new phase.

\*Piburn, M., & Sawada, D. (2000). Reformed Teaching Observation Protocol (RTOP) Reference Manual. Technical Report

Table 1: Lesson Study Activities in School A in 2021-22

Cycle	Dates	Grade	Topic
Pre	7/26	Discussion on the research theme	
1	9/14, 9/22	4	Where do the water drops on a cool cup come from?
2	10/19, 11/12	6	How can you make the lever balanced when both the weight and position are different on the left and right arms?
3	11/2, 11/18	5	How can you make the excess amount of alum dissolve in water?
4	12/7, 12/16	3	How can you make electricity transmit in a piece of golden paper?
5	1/11,1/19	4	How does air move in the warmed bottle?
Post	2/24	Discussion on the question of what was achieved and what wasn't achieved	