5. Researchers' Comments (English)

00:00:00 **Discussion.** The teacher wants the students to summarize, in groups, the results of the experiment they did yesterday. However, before doing so, he engages them in a discussion about Benedict's solution. He asks one student what Benedict's solution is used for; the student responds that the information is not written in his notebook. The teacher then asks another student, and the student responds that Benedict's solution is used to detect sugar. This back and forth dialogue between the teacher and students represents a discussion. In the Japanese lessons, 10% of science instruction time was devoted to discussion (Roth et al., 2006, *Teaching Science in Five Countries: Results from the TIMSS 1999 Video Study* [hereafter Video Report], figure 9.1).

00:02:55 **Scientific laws and theories.** After reminding the students about how they detected sugar and starch, the teacher begins to explain the differences between the molecular structures of sugar and starch. This type of canonical information represents scientific law and/or theory because it postulates underlying conditions that explain patterns in data. On average, 15% of the Japanese lessons publicly presented scientific ideas related to laws and theories, less than in the Czech Republic (Video Report, figure 5.12).

00:04:44 **Groupwork.** Students form groups and begin working on their summaries. In the Japanese lessons, four percent of the science instruction time was spent with students working in groups during independent seatwork activities (Video Report, figure 8.3).

Data. Students are writing summaries using the data from the iodine reactions and the Benedict's solution reactions. This lesson is unique in that the students collected these data in the previous lesson, rather than during the current lesson. In the Japanese data set, 90% of the lessons contained first-hand data, more than in the Czech Republic and the Netherlands (Video Report, figure 6.1).

00:07:45 **Teacher-student interaction.** This is typical of the time the teacher spends interacting with the members of each group, helping them to summarize their results. This particular teacher-student interaction lasts until 00:09:52. Twenty-two percent of science instruction time in the Japanese lessons was spent on private teacher-student talk (Video Report, figure 9.2).

00:10:48 **Generating written responses.** The teacher encourages the students to write more information in their summaries during the independent seatwork activity. Generating written responses that require students to construct a sentence or more occurred in 22% of the science instruction time in the Japanese lessons (Video Report, figure 9.5).

00:36:51 **Main conclusion for independent practical activity discussed.** At this point, the teacher summarizes the results of the experiment through patterns observed in the data. In 34% of the Japanese lessons, outcomes from independent practical activities were discussed as main conclusions (Video Report, figure 7.3).

Making connections through inquiries. The teacher's summary on the board helps illustrate how science knowledge was derived from practical experiences. Such an inquiry/inductive approach for making connections between data, patterns, and explanations occurred in 57% of the Japanese lessons, more than in all other countries except Australia (Video Report, figure 5.6).

00:42:47 **Science notebooks.** Students are asked to copy notes from the blackboard into their notebooks. Fifty percent of the Japanese lessons had students using organized science notebooks (Video Report, figure 11.1).