Revitalizing Japanese Lesson Study Through Shared Tools Embedded in Design-Based Implementation Research

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Abstract: In order to tackle the *persistent problem* revealed in a Japanese learning sciences project, we attempted to identify an effective design for pre-lesson study workshops that supports teachers to focus on students' cognitive processes. A set of tools for simulating students' learning processes enabled participant teachers to take learner-centered perspectives, which contributed to making their images of what and how the children will learn more concrete.

Introduction

This paper clarifies an effective scaffold for teachers to focus on students' cognitive processes in creating and revising their lesson plans. The context for this study is design-based implementation research (DBIR: Penuel *et al.*, 2007) in a Japanese learning sciences project for promoting collaborative learning using a lesson framework known as the Knowledge Constructive Jigsaw (KCJ: Miyake, 2013). Approximately 1,000 teachers of all subjects from the 1st to the 12th grade in collaboration with 30 regional boards of education participate the project. The project has formed professional learning communities of teachers who share the KCJ method and its "lesson study" (Lewis, 2002) as a *common tool* (one feature of DBIR) in order to first, improve the quality of students' learning as well as the teachers' learning of "how students learn", second, encourage networking among the teacher communities, and third, to clarify how to support such improvement and networking in a sustainable way. The project revealed a *persistent problem* (another feature of DBIR), which is many teachers lack the habitual practice of focusing on the cognitive processes of the students (i.e., "How will students make sense of this task and read this material?") when they develop lesson plans. Although Japanese "lesson study" is known to be an effective form of professional development (Lewis, 2002) in which teachers observe live classroom lessons, collect data, and collaboratively analyze such data, two trends do not successfully merge into scalable action research: one trend focuses on what and how teacher *should teach* and the other focuses on what and how students *learned*. Faced with a scaling-up issue where researchers cannot directly help teachers explore students' learning processes, we propose a set of scaffolding for teachers to constructively interact with one other at their local school in forming and testing hypotheses about student learning (how they *will* learn) in their own lessons. This small research would suggest that additional but simple tools embedded in DBIR can contribute to DBIR of a higher quality.

Methods

This paper tests the hypothesis that a set of DBIR and its shared tools effectively support teachers to *simulate* how students will learn, and enable them to make their own hypotheses about students' learning process in the lesson. Specifically, we created a tool which is a set of "simulation sheets" of students' learning processes in the lesson for a pre-lesson study and shared it with the above DBIR community. It is not easy for one teacher to have concrete images of the diverse processes of students, to which multiple teachers with different points of view can make vast contributions, especially in the DBIR community which shares a common vision and instructional framework.

We took three cases (see Table1) from a pre-lesson study workshop, which collected 37 teachers of a municipal board of education. In this workshop, three designated teachers brought their lesson plans, each of which was collaboratively scrutinized through a three-step process. In the preliminary step (45 min), the teachers experienced a lesson as students to grasp an outline of the plan. In Step 1 (45 min), teachers anticipated the learning processes of the best student and the poorest one in this lesson plan based on their experience as students: "What answers are they likely to write at the beginning of the lesson?" "What are they likely to talk about during their discussions?" and "What are they likely to write after the lesson?" In Step 2 (45 min), they revised the lesson plan based on the simulation of Step 1. In both Step 1 and Step 2, the teachers use lesson design study sheets (shared tools), discuss the lesson plan in small groups, and present their findings to other groups.

In order to show that the simulation of the students' learning processes was properly done in Step 1, we analyzed the presentations from each group, where the representatives of the groups gave summaries of their group discussions in Step 1. We divided the reports by sentence and compiled the percentage of sentences with "a learner" or "learners" as the subject (learner-subject-sentences) in the number of sentences with subjects. The more we find learner-subject-sentences in the reports, the more we can consider participants engaged in the

simulation activities. Second, in order to show that revision from the students' viewpoint also continued in Step 2, we categorized the content of the presentations into four groups by combining two axes: Content (C) versus lesson design (LD), and learner-centered (LC) versus non-learner-centered (N-LC). We mostly focused on how teachers' simulation can change from N-LC to LC.

Results and discussion

Table 1 shows the analytical results of Step 1 to demonstrate in what proportion the teachers used learner-subject-sentences. As shown in the table, the teachers used them in 76.5% out of 102 sentences. The results indicate that the teachers engaged in simulating students' learning as we had expected. Table 2 shows the analytical results of Step 2 to demonstrate in what proportion the teachers referred to the contents or lesson designs from a learner-centered perspective. As shown in the table, the teachers considered those perspectives in nearly 60% of their utterances in every lesson. The results also indicate that the teachers engaged in pointing out the problems and making proposals based on their simulation of students' learning.

Table 1: Effect of Step 1: In how many sentences did the teachers refer to the learner(s) as the subject?

Lesson Plan (Grade, Subject)	Number of participants (and groups)	Learner-subject-sentences
Water in nature (G4, Science)	17 (5)	41(82.0%)
Programing (G6, ICT)	10 (3)	18 (81.8%)
Speech technique (G9, English(ESL))	10 (4)	19 (63.3%)

Table 2: Effect of Step 2: In how many topics did the teachers refer to the learner(s) as the subject?

Lesson Plan	Number of topics	C/LC	C/ N-LC	LD/LC	LD/N-LC	Proportion of LC
Water in nature	17	6	2	6	3	70.6%
Programing	13	4	2	3	4	53.8%
Speech technique	11	3	4	4	0	63.6%

Each teacher improved her or his own lesson plan after this pre-lesson study workshop for the teaching of their lessons. In addition, some participants brought those tools back to their schools and tried this new style of lesson study with their colleagues. These results indicate that the teachers perceived the simulation of students' learning processes to be new and useful. Even though our tools are very simple and easy to use, they worked because of the help of a shared context created and sustained through partnerships among university researchers, boards of education and the teachers themselves. Sharing context enabled everyone to share visions and images of learning goals, to identify the task of how to realize such vision and learning, and to utilize the instructional framework as a means to solve the task. The framework, that is, the Knowledge Constructive Jigsaw, was simple enough for teachers to simulate what would take place in each step of learning. Therefore, this scaffolding, in other words, shared tools embedded in design-based implementation research, enables lesson study to be revitalized as a whole. We would like to examine how this type of lesson study will contribute to teachers' reflection upon the lesson conducted (post-lesson study), and whether we can train teachers to be able to facilitate these kinds of workshops instead of ourselves for further up-scaling.

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