

Reusing Practical Teaching Strategies in a Community of Teachers

- A Case study in a Community of Junior High School Teachers in Japan -

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Abstract: In this paper, we discuss reuse of teaching strategies that schoolteachers employing in practice. One of the significant capabilities of teachers is to blend content knowledge and general pedagogical knowledge within a context. The authors carried on a case study of modeling practical teaching strategy of schoolteachers in order to facilitate reusing them based on an ontological engineering approach. As the result, the teacher could design lesson plans serving his different two intentions.

Keywords: Ontology, Instructional design, Knowledge sharing

1. Introduction

One of the important goals of teacher development is to gain a capability to blend content and pedagogical knowledge depending on lessons. Such blended knowledge is referred to as pedagogical content knowledge (PCK) (Shulman, 1986). Before teachers deliver lessons they explicitly or implicitly make plans of lessons and occasionally describe them in a format called “lesson plan.” A lesson plan is a description or an outline of a lesson including the goals, the activities that a teacher will do, and the materials as well as anticipated problems and errors (Richards and Lockhart, 1994). Lesson plans are considered as a description of PCK and can be used as a vehicle of PCK (Juang et al., 2008).

The goal of this study is to develop a technology for facilitating to share and reuse of pedagogical knowledge described in lesson plans based on an ontological engineering approach (Mizoguchi and Bourdeau, 2000)(Devedzic, 2006). This study uses OMNIBUS ontology (Hayashi, et al., 2009) as the basis for modeling teaching strategies. This paper reports the result of practical experiences that the authors have conducted with an official research group of schoolteachers of Tokyo prefecture in Japan, named “ToChuSha”. This group consists of only practicing schoolteachers of all ages that are from novices to experts. They advise each other on lesson plans that they made by themselves. Through this activity, they share their experiences and develop their teaching skill.

The structure of the rest of this paper is as follows. Section 2 gives an overview of OMNIBUS and the relation between OMNIBUS and PCK. Section 3 explains the result of the extraction of teaching strategies from lesson plans and the creation of new lesson plans with the strategies. Lastly, Section 4 and concludes this paper.

2. OMNIBUS Ontology as a Basis for Modeling Teaching Strategies

OMNIBUS is the ontology to organize teaching strategies included in learning and instructional theories as well as in empirical knowledge of schoolteachers. Two important concepts in OMNIBUS are I_L event and WAY. I_L event is a concept that is composed of

state change of a learner (learning goal), a learner's action that cause the change (learning action) and an action facilitates the learning action (instructional action). WAY is the concept that links I_L events with decomposition and achievement relation. This represents how to teach learners for achieving a learning goal represented by an I_L event. These two concepts can describe the plan of a lesson as a tree structure of WAYs that is a part-whole structure of learning goals. In OMNIBUS scenario model refers to such a structure made by WAYs.

As mentioned above, PCK represents the blending of content and pedagogical knowledge and lesson plans are the descriptions of them. The concept of WAY can be used for describing PCK and general pedagogical knowledge. WAYs included in a scenario model are connected with content knowledge, and they represent PCK. On the other hand, if WAYs can be separated from content knowledge, it will represent general pedagogical knowledge. In OMNIBUS, such a WAY is called as WAY-knowledge. This relation between WAY and WAY-knowledge contributes to share and reuse both cases of lessons and teaching strategies as general pedagogical knowledge.

3. Modeling Practical Lesson Plans

Based on OMNIBUS, the authors made two scenario models from two lesson plans made by two different teachers in ToChuSha. These two lesson plans are similar because both of them adopt the same policy that learners learn through discussions with others and make self-evaluation of their thinking. They have some differences that come from characteristics of students that get the lesson and the teacher conduct it.

Table 1 presents the quantitative data of the two scenario models. The model of the lesson plan1 (LP1) is composed of 69 WAY and 93 I_L events. These WAYs include the same WAYs that both macro and micro I_L events are the same. These 69 WAYs are classified into 17 types of WAYs. On the other hand, lesson plan2 (LP2) is composed of 58 WAY and 81 I_L events and these WAYs are classified 14 types of WAYs. These scenario models include 12 common types of WAYs. These same types of WAYs show the similarity of these lesson plans.

Table 1 quantitative data of each I_L scenario models made from lesson plans

	# of I_L event	# of leaf I_L events	# of WAYs	# of types of WAYs	# of common types of WAYs
LP1	93	26	69	17	12
LP2	77	21	57	14	

In addition to the types of WAYs extracted from the two lesson plans, 48 types of WAYs are made from the interview with one of the teachers. In the interview, the authors asked one of the teacher about the other WAY to achieve I_L events included in the models from their lesson plan. As the result, the authors describe 72 types of teaching strategies used in ToChuSha as pieces of WAY-knowledge.

To examine the potential of the reusability of WAY-knowledge, one of the teacher use pieces of WAY-knowledge experimentally for designing new lessons. The main goals of new lessons are the same as the lesson plan1 and 2. The difference between lesson plans ones in the previous section and new ones is the conditions of lessons. Although the former is for one period, the latter is longer or shorter lesson. One has more than one class, and the other has shorter time to teach the topic. Here, we call the former Long lesson plan (LLP) and the latter short lesson plan (SLP). The former one, Long lesson, can include many activities to exchange and evaluate their own opinions each other. On the other hand, the latter one, Short lesson, cannot secure sufficient time for such activities. This lesson requires an alternative to group discussion of students for a mutual exchange of their own opinions.

Following the conditions, the teacher made lesson plan with pieces of WAY-knowledge extracted from lesson plans, LP1 and LP2. The teacher could make two satisfactory lesson plans just using pieces of WAY-knowledge in a short time. Especially, he could change the focuses of lessons. Although in LLP he set some opportunities to evaluate learners' own and others' opinions, in SLP he made a plan in which he represents his evaluation of students' opinion. He said that choosing a teaching strategy from pieces of WAY-knowledge is helpful for designing lesson. He also said he could choose appropriate strategies for shortening the time of the lesson. Table 2 presents the quantitative data of each I_L scenario model of new lesson plans. 10 WAYs are the same in the lesson plans, and the other WAYs represent the difference between them. All the WAYs used in them are extracted from the lesson LP1 and LP2.

Table 2 quantitative data of each I_L scenario models made by the teacher

	# of I_L event	# of leaf I_L events	# of WAY	# of WAY-knowledge	# of common WAY-knowledge
LLP	87	23	66	24	10
SLP	78	19	56	17	

4. Conclusion

This paper presents the potential of the reusability of teaching strategies in practical lesson plans based on OMNIBUS. In the case study reported on this paper teaching strategies are described with the concept of WAY. The authors extracted teaching strategies from two lesson plans as pieces of WAY-knowledge and then, using such descriptions of teaching strategies as WAY-knowledge, a teacher could make two lesson plans serving his different two intentions.

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