Chapter 16

Cultivating Student-Teachers' Problem-Solving Abilities by Promoting Utilization of Various Ways of Thinking through E-Learning and E-Portfolio Systems

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EXECUTIVE SUMMARY

This chapter presents a teacher training program that promotes the use of various views and ways of thinking in each subject area (e.g., analogy and quantify in mathematics, and 5W1H in Japanese language courses) to cultivate problem-solving abilities. Although these views and ways of thinking are currently objectives in the Japanese National Course of Studies, teachers have not been instructed on how to teach them. The program was part of the Exercise of Integrated Learning, which is a compulsory course according to the Japanese national standards for teacher preparation programs. The course consisted of five three-hour lessons devoted to practice. Two additional sessions, each seven and a half hours long, were conducted with presentations on problem-solving exercises and a workshop on lesson plan revisions, respectively. The content of each practice lesson focused on one of the two following goals: (1) providing experience with problem-solving-related learn

ing and (2) ensuring that teachers are able to create lesson plans for this type of activity. The program proposed in this chapter falls into the former category. In the program, students received homework assignments on the e-learning system after each lesson. In these e-learning materials, they practiced applying what they had learned during the lessons, such as problem-solving methodologies and views and ways of thinking in various subject areas. After the five practice lessons, there was a two-week gap before students gave presentations during a presentation session. The learners completed problem-solving exercises using the e-portfolio system the team developed. This e-portfolio system allowed learners to conduct collaborative problem-solving exercises while utilizing the aforementioned views and ways of thinking. Furthermore, learners automatically shared their performance records and outcomes after completing the tasks, and they were able to perform self-evaluations learning by following a rubric. Finally, the teacher analyzed the effectiveness of the course and revised the program.

INTRODUCTION

Issues in Japanese Secondary School Education: Focusing on Cultivating Problem-Solving Abilities

According to Matsuda (2009), Japanese secondary school teachers face the following problems. First, Japan follows the National Course of Studies (NCoS) and textbooks that are authorized by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The NCoS outlines the school education, and the textbooks are the samples of its embodiment, which implies that the designing of lessons are not very constrained. However, many teachers do not actively design lessons, and their lesson style is just an outline of a textbook. Such practices do not sufficiently focus on students' interests and learning needs. Second, twenty-first century literacy requires creativity and problem-solving abilities as well as the utilization of information and communication technology (ICT). However, teachers still believe that the problem-solving abilities they should cultivate are those required to pass the entrance exams for upper-grade schools. Therefore, they make students memorize as much knowledge as possible and train students to apply rules and procedures to test problems. Third, changes in the goals of school education are concerned with the progress of ICT use in our society. However, teachers in Japanese schools feel that their jobs and daily lives do not require the use of ICT. Therefore, they are not interested in using ICT in their instruction or in informatics education in general. For example, the National Institute for Educational Policy Research (NIEPR) reported that the respective percentages of social studies, mathematics, and science teachers

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