

Chapter 18

An E-Portfolio System for Cultivating in Students the Ability to Perform Educational Technology Research: For Quality Assurance of Master's Course Students' Problem-Solving Abilities

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ABSTRACT

This chapter will propose an e-portfolio system cultivating the problem-solving abilities of students through master's thesis research activities. By using this system, students should be able to conduct research on educational technology. However, most of the functions are general-purpose functions. The design and implementation of the system will be discussed as follows. First, a model will be developed to show the problem-solving abilities cultivated by students through coursework and laboratory work. These include knowledge acquisition through lectures, literature review activities, the development of gaming instructional materials, and experimental lessons. Based on the above model, the chapter will then clarify instructional contents required for students during lessons and laboratory seminars. In addition, e-learning materials will be designed to help students in learning and self-assessing their knowledge acquisition. The chapter will conclude by formulating methods to collect student information, as well as support, evaluate, and provide feedback for their laboratory work.

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INTRODUCTION

All master's students in Japan, except those studying for a professional degree, are required to write a research thesis in addition to earning a designated number of credits at the end of their program (Ministry of Education, Culture, Sports, Science and Technology, 2015). These research projects use an on-the-job training approach. Many professors who supervise master's research projects confuse "helping students produce good results" with "educating students on how to produce good results." Therefore, a report issued by Japan's Central Council of Education (2011) proposed the following improvements to graduate school education: (1) establish systematic curricula at every stage, from coursework to training, in master's research activities; (2) promote the publication of educational information; and (3) establish quality assurance systems for education and research training.

Accordingly, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) asked all universities to revise existing curricula to comply with recommendations. They were then asked to publish the updated educational information on their websites. Most universities followed the example without substantial curricular revisions. Many universities introduced e-portfolio systems to provide students with guidance from supervisors and academic advisors. However, to ensure the quality of students' abilities, the functions and scopes of these systems were limited. For example, most of the evidence comprised students' end-of-semester self-evaluations and records of event attendance (including academic conferences, study abroad programs, and internship programs). In this system, reliability was a problem because self-evaluations depend on episodic memory and students' individual choices. The educational impact of the feedback was minimal because supervisors provided only brief comments indicating that s/he glanced over the portfolio. Students and professors used the e-portfolio system as "part of their duty." Few users valued the merits and effects because they were unaware of the learning objectives of the master's thesis project.

As concluded by the National Institute of Educational Policy Research (2014) report, many countries require the same qualifications and abilities for students. Typically called "21st-century skills" or "key competencies," these qualifications include problem-solving, critical thinking, self-learning, collaboration, and self-management. In accordance with this report, MEXT facilitates educational reform at all school levels. In Japan, especially, the connection between upper secondary schools and universities is criticized such that education for passing the entrance examination must be changed to that for nurturing problem-solving abilities necessary to explore problems that have no single correct answer (Ministry of Education, Culture, Sports, Science and Technology, 2014).

The author determined that problem-solving is the most important ability to be cultivated in a master's course student through a master's thesis research project. Bruer (1993) noted that domain-specific knowledge, metacognitive skills, and general strategies are all elements of human intelligence and expert performance. Moreover, Bruer (1993) noted that informed instruction of general strategies encouraged learners to acquire and utilize them in varied contexts. This is key to ensuring the quality of students by providing informed problem-solving instruction during activities rather than assessing the results of such activities.

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