

On Developing an Integrated Teaching and Learning Environment Providing a Bridge between Research Findings and Teaching Practice in Statistics Education

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There is a gap between research findings in statistics education and teaching practice. Many researchers suggest various teaching methods and learning contents for improving students' understanding and developing problem-solving abilities in real problems, and they argue that such methods could improve student learning of statistics. Even though the research findings were verified, however, there are numerous barriers in the classes of the teachers, since they are not educational researchers. The questions that arise are: (1) How can teachers know the research findings; and (2) How can teachers implement the research findings in the classroom.

Actually, it is nearly impossible for teachers to read all the papers related to statistical education and they implement the research findings in their classes. Most teachers cannot apply the research findings because they do not know the research. Also, even if they get to know the research findings, they are reluctant to use the research findings for their teaching for several reasons such as time restrictions in preparing lessons, spatial restrictions, the difficulties in using technology and so on. As a result, most teachers adhere to teacher-centered instruction, which has been pointed out by many studies while students still recognize that statistics is

very difficult to learn. At the same time, students are reluctant to be attentive to the class work even though they think that the study of statistics needs considerable time and effort.

The purpose of this study is to create an environment which enables students to learn with enthusiasm and involvement, not as passive consumers but rather active participants. This study also presents an integrated environment in which the teacher is able to give immediate feedback to students by quickly understanding the students' learning status, and to use several pedagogies and various learning contents with minimum effort.

This study develops an integrated teaching and learning environment providing a bridge between research findings and teaching practice in statistics education by using the recent advanced technology. To develop the environment, the following design principles were considered:

- to enable various pedagogies, learning theories and contents to coexist;
- to accept changes in society and technology;
- to be able to collect and analyze Learning History Data;
- to support students participation, open and share learning outcomes;
- to support tools for students management and course management;
- to support tools for investigation to the state of use and class satisfaction; and
- to provide various roles and an individualized interface or view depending on the roles.

The developed environment proposed in this study compares Learning Management System, the infra of the teaching and learning environment, from a functional perspective. It also compares some e-Learning tools for statistics education.

Learning History Data and survey data were collected through using the developed environment in several classrooms. This study examines the usefulness of the environment based on the analysis results. The results indicate students' attitudes to things such as learning time, participation, concentration and solving their assignments on their own have changed positively.

The developed teaching and learning environment in this study is significant in the sense that it enables teachers to use several teaching and learning methods easily without increasing their workload. In particular, it contributes to students engaging in the classroom with ongoing concerns.