Physics laboratory in UEC

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The University of Electro-Communications (UEC) has turned out many competent engineers and scientists in the fields of wireless communications, electronics, mechanical engineering and natural science. About 95% of first-year students have taken both PHYSICS I and II in their senior high school, but experimental contents in their curricula are limited. Therefore, a large number of students know physics formulas by heart, and poorly understand them by connecting with experience. In addition, they have no skills and know-how about technical writing.

In UEC, all the students take “Basic Physics I”, “Basic Physics II” and “Physics Laboratory” as required subjects. Physics Laboratory is designed mainly aiming at learning the skill of basic experimental technique and technical writing. It is a widely-practiced program for first-year students in Japan, in which twelve staffs (seven teachers and five teaching assistants) teach about 120 students in the same time. On the other hand, Basic Physics I is a lecture on mechanics, waves and oscillations, and Basic Physics II is on thermodynamics and electromagnetism. The aim of these lectures is to understand physics phenomena with mathematical treatment.

We found that the grade of “Physics Laboratory” have strong correlations with the grades of these lectures, “Basic Physics I & II”, in UEC. This fact makes us expect that effective teaching method or educational system on physics laboratory would improve comprehensive understanding of physics with mathematical abilities, although goals of lectures and physics laboratory are different.

In this context, to improve Physics Laboratory class, we introduced two systems about supporting students’ learning and staff’s teaching. The former is to provide teaching aids via e-Learning system, e.g. how to draw figures and tables, templates using word processor, quizzes, pictures and movies and so on. The latter is to share various student records such as attendance, evaluation of reports. The evaluation by other teaching staff is sometimes useful in teaching the student.

In this presentation, the details of these systems are introduced and the educational effects are discussed.