A proposal and evaluation of flipped classroom under online education

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Learners in higher education need to develop learners' competency through autonomous learning with knowledge acquisition in various situations of lectures.

In the previous study, we proposed a flipped learning model that provided learning materials and courses according to the learners' level of understanding. According to the findings, this model was confirmed that learners prepare for the class autonomously. However, there is still a problem that autonomous learning is suppressed because the work assigned to each learner is provided at the start of the classroom time and is expected to be completed on time.

In this study, we propose and evaluate a class model where we extend the flipped classroom model proposed in the previous study to a full online model, in order to allow learners to proceed with their learning more autonomously. The revised model is shown in Figure 1. In the revised model, learning activities except for a group work are assigned as asynchronous tasks outside the class time using a learning management system. The teaching form is changed from face-to-face to online using video conferencing tools, and only group work is conducted during the class time.

We perform and evaluate a case study of programming classes in 2020-2021 Learners are asked to answer questions in the questionnaire such as "Which learning model is4 better, this one or the previous one?"-Approximately 80 percent of the students chose ''This learning model''. The results show that the revised model is well accepted for leaners. We investigated the reason and found that many students cited the ability to learn at their own pace and devote more time to class assignments with motivators.

Next, we conducted nine surveys to evaluate the proposed model by analyzing learners' learning attitudes, results, and transitions of learning activities observed from learning data in the system. As a result, it was suggested that the proposed model has a possibility that learners can do autonomous learning, utilizing the online environment. Furthermore, we classified learners' learning into eight patterns, visualized it using a state transition figure, and verified the advice mail according to the state transition. As a result, we found that-state transitions of some learners are improved, that suggests possibility of improvement of learning state.

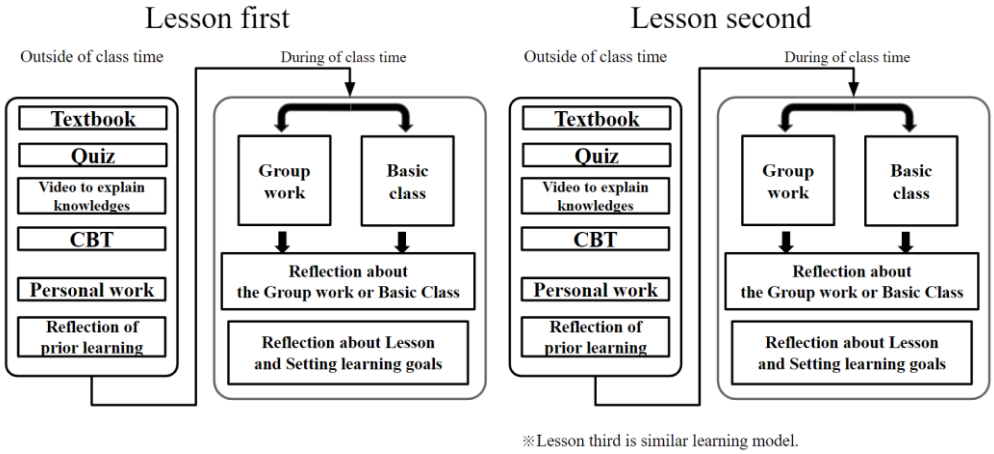

Figure 1. Proposed new flipped classroom model