Asia Programme, final report for projects 2018-2020

SUMMARY REPORT FOR PUBLICATION

**Name of the project**
Adapting Finnish Programming Education Solutions in Korea

**Coordinating Institution**
Aalto University, Finland

**Partner institution(s)**
Chosun University, Republic of Korea

**Objectives of the project**
The project was initially planned when professor Lee Jeong-A from Chosun University visited Aalto University during her sabbatical year in 2017 and familiarized with the research and practice in programming education carried out by members of LeTech research group (LeTech; http://research.cs.aalto.fi/LeTech/). LeTech has developed an open source specialized learning environment (called A+, https://apluslms.github.io) which supports building interactive learning content including automatic assessment of programming exercises, dynamic program visualizations, dynamic feedback collection during the course, and learning analytics.

The goals of the project were to disseminate, customize and evaluate these online-supported pedagogies for programming education in Korean context. To achieve this, the project planned to implement two study modules for programming education that have been developed by the LeTech teachers and to introduce these modules and their supporting technologies into a Korean curriculum at Chosun University. The two modules would act as pilot modules for introducing novel learning technologies and approaches first in Chosun and later in other Korean universities, including KAIST.

The first selected module was the course Programming 1, CS-A1110, the introduction to programming course in Scala, which has been organized at Aalto University since 2014 and has also been provided as an open course, MOOC. The second module was Web software development, an intermediate course in web programming. During the project, department of computer science at Aalto decided that the latter course will be totally revised for academic year 2020-2021, and thus disseminating the former version to Chosun was not considered meaningful. Instead, we decided that a totally new course CS-CJ3171, Introduction to web development and programming, which was developed and launched in spring 2020, would replace the planned module in this project.

**Achieved results and outcomes**

Two professors at Chosun University, Prof. Lee Jeong-A and Prof. Choi Woo Yeol familiarized with the A+ system and the learning resources on Programming 1. The whole semester course at Aalto was deemed too demanding for BSc students at Chosun context as one course, and therefore the trial course was split in two parts, which were given at Chosun separately. The first course started in March 2019. There were in total 120 Korean undergraduate students participating it, who were split in three groups taught by prof. Lee Jeong-A and prof. Choi Woo Yeol. The course covered the first half of the course in Aalto. The second part was taught in autumn 2019.
To enable building a customized version of the course, a separate server was set up at Aalto which included the learning resources for Chosun context, as well as Chosun student data. Using this practice, the courses were successfully carried out at Chosun with Korean teachers giving local support for students. Aalto provided only technical support in customizing the contents and resolving minor technical challenges during the course at the Aalto server.

In July 2019, prof. Lee Jeong-A gave a 3-week intensive programming course for Computer education Master program students at Chosun using the same resources. This version was also successfully completed. Overall, the courses at Chosun were well received by both teachers and students. In 2020, the course has been given again at Chosun.

The second target course, Introduction to web development and programming, was launched at Aalto in spring 2020. Initially, the plan was that course teacher Dr. Lassi Haaranen would visit Chosun in summer 2020, and give the course there in collaboration with Chosun faculty members. The Covid-19 pandemic, however, prevented these plans to be realized, and all travelling of faculty members was banned by Aalto University in spring 2020. In any case, global travel restrictions would have made any journeys very difficult to organize. Therefore, the course was only provided as a MOOC, which was as such available for Chosun students, too. However, teacher collaboration and technology transfer to Chosun were lacking, since no on-site pilot version could be organized. Thus, transferring this module to Chosun has not actually been realized yet.

Activities carried out during the project

The implementation of the project started in December 2018, when prof. Lauri Malmi and PhD student Lassi Haaranen (gained PhD degree in February 2019) visited Chosun University (Malmi: one week, Haaranen, two weeks). During this visit:

- They familiarized with the educational context at Chosun University
- Demonstrated the programming education environment and pedagogies for teachers at Chosun University
- Met the president of Chosun University to discuss collaboration between Chosun and Aalto
- Gave a presentation of the novel technologies and their benefits for a wider Korean audience at a seminar for programming teachers organized at KAIST
- Discussed with the Korean government officials for possibilities of collaboration to improve Korean computing education.

In spring 2019, a dedicated A-plus server including course resources for introduction to programming in Scala (at Aalto course: CS-A1110, Programming 1) was set up in Aalto to host course content for Chosun University. Prof. Lee Jeong-A visited Aalto in Jan-Feb 2019 and final arrangements for the course at Chosun were agreed on.

The courses were given at Chosun, as described above. Prof. Lee Jeong-A also visited Aalto in August 2019 and participated A+-seminar where new developments on the system were presented. In October 2019 Prof. Lee Jeong-A and Prof. Choi Woo Yeol visited Aalto and reported their experiences in giving the courses. Moreover, they familiarized more closely on the technologies and practices how the dynamic learning resources, including creating automatically assessed exercises can be developed for A+ environment.

During their visit, activities were planned for year 2020. However, in March the Covid-19 pandemic prevented any further travelling and thus only online contacts could be maintained. The introduction of the second course, web development and programming, at Chosun was postponed till future until travelling would be possible.

Future developments, resulting from the project

The long term goal of the project has been to transfer the used technologies (A+ environment and relevant course resources) to Chosun so that they are able to set up their own server and develop their own expertise skills to maintain and further develop these resources. Chosun has recently found a good person with relevant technical
skills. This allows us carry out further collaboration remotely, even though traveling is currently not possible due to the pandemic. This recruitment is important for the continued collaboration, because in autumn 2020, Department of computer science at Aalto decided that maintaining a separate server for Chosun was not a sustainable solution. There had been changes in Aalto support personnel team and before new recruitments were successful, the team capacity has been seriously limited.

In current circumstances, Aalto could give Chosun guidance from distance for setting up their own service.