Development of Building Construction Blended Curriculum for Korean Universities

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Abstract

The COVID-19 pandemic and the Fourth Industrial Revolution have brought about significant changes in education at Korean universities. Two typical examples are the expansion of online learning and the spread of innovative teaching methods. Online education has advantages in that it allows learners to repeat learning and learn freely, regardless of time and place. It is necessary to develop and operate the curriculum in ways that can utilize the advantages of online education and compensate for its disadvantages. Therefore, this study sought to develop an education method that combines online and offline education. The main contents of the convergence curriculum developed in this study are as follows. Basic theory education is conducted online, and intensive education is conducted offline. 3 hours of education per week consists of 1.5-2 hours of online education and 1-1.5 hours of offline education. Learners learn in advance using an online system (LMS). Deep learning is conducted in the classroom. Deep learning consists of quizzes, complex problem solving, and Q&A. The curriculum focused on weekly education procedures and the contents of education for each 15-week period. The curriculum proposed by this research could be applied flexibly according to the education goals of the instructor and the learning capabilities of the students.

Keywords: Building Construction, Team-Based Learning, Innovative Teaching Method, Convergence Curriculum

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Introduction

The COVID-19 pandemic and the Fourth Industrial Revolution have brought about significant changes in education at Korean universities. Two typical examples are the expansion of online learning and the spread of innovative teaching methods. It is time to address these changes and difficulties in the educational environment and discuss effective education methods for the future. Online education has advantages in that it allows learners to repeat learning and learn freely, regardless of time and place. However, learning from video lectures makes it difficult for learners to concentrate and interact with professors. Therefore, it is necessary to develop and operate the curriculum in ways that can utilize the advantages of online education and compensate for its disadvantages. Therefore, this study sought to develop an education method that combines online and offline education as one of the ways.

Development of Online-Offline Convergence Curriculum

Development Scope of Education Method

The blended education method to be developed in this study was aimed at a 4-year architectural engineering program at Korean universities. Specifically, the major course was assumed to be building construction in the third year. It was also assumed that the education period would be 15 weeks per semester, and three credits would be allocated to a theoretical course for three hours per week.

Development of Weekly Education Process

The education process with three hours per week was developed as shown in Table 1. The basic theory course is offered online, while the deep learning course is provided offline. It was suggested that the three-hour course program operates 1.5 – 2-hour online classes, and 1-1.5-hour offline classes. For online education, professors record video lectures and upload them to LMS, while learners use the video lecture on the LMS and learn at any time or place. For offline education, professors give deep learning lectures, while leaners take various types of deep learning according to the guidance of the professor. The contents of deep learning include quizzes, Q&As, problem-based learning, and field investigations. The content composition of deep learning varies depending on the educational objectives of each professor and university.

Methods	Online	Offline
Contents	Basic theory	Deep learning
Place	LMS	Classroom
Hours	1.5 – 2	1 – 1.5
Details	-Professor: lecture video production and upload -Student: individual study (lecture video, lecture note, textbooks use)	-Quiz (5-20questions multiple choice) (4-10times) -Q&A (every week) -Problem based learning (2-6times)

Table 1. Education process (3hours)

Development of Weekly Educational Content

In general, the curriculum at domestic universities consists of 15 weeks per semester. Table 2 shows the developed education content for 15 weeks in a semester. Exams are conducted twice (mid-term exam and final exam), and online and offline classes are carried out for the remaining 13 weeks. In online education, a basic theory course is offered via video lectures recorded in advance by the professor. In offline education, the deep learning course is provided along with quizzes, Q&As, problem-based learning and field investigations. The purpose of the quiz is to evaluate the level of mastery in a basic theory course offered online. In general, 5 to 20 multiple-choice questions are given in the quiz. Learners solve questions and submit their individual answers, and also work in teams to discuss and submit the answers, which induces peer learning and deepens basic theory learning.

Weeks	Online(basic theory, lecture video)	Offline(deep learning)
1	Chapter1 General theory of building construction	Mock quiz, Team composition (5-7per by team)
2	Chapter2 Temporary work	Problem based learning1 (team) : temporary work
3	Chapter3 Earth work	Quiz1 (individual, team) : chapter1, 2
4	Chapter4 Designated and Foundation work	Field survey1 (team) : plan presentation, plan submission
5	Chapter5 Form work	Quiz2 (individual, team) : chapter3, 4
6	Chapter6 Reinforcing bar work	Problem based learning2 (team) : earth work or foundation work
7	Chapter7 Concrete work1	Quiz3 (individual, team) : chapter5, 6
8	Exam(mid term)	
9	Chapter7 Concrete work2	Problem based learning1 (team) : form work or reinforcing bar work
10	Chapter8 Steel structure work	Quiz4 (individual, team) : chapter7
11	Chapter9 Masonry work	Field survey2 (team) : result presentation, result report submission
12	Chapter10 Waterproofing and damp proofing work	Quiz5 (individual, team) : chapter8, 9
13	Chapter13 Tile and stone work	Problem based learning1 (team) : concrete or steel structure work
14	Chapter19 Curtain wall work	Quiz6 (individual, team) : chapter10, 13, 19
15	Exam(final term)	

Table 2. Weekly education content

Problem-based learning is to work in teams to solve open-ended problems that arise from practical affairs at construction sites. In this way, learners can develop their practical

capabilities. The field investigation is to visit the construction site, conduct on-site surveys and then prepare the survey report for each team, through which learners can directly check the basic theories learned in advance at the construction site and study in depth through interviews with experts. The Q&A method is used in traditional theoretical education, but the Q&A session after learning about basic theories can be carried out more actively. It is also a good way to give additional points to encourage greater participation among students. The deep learning course conducted through team activities includes quizzes (solving in teams), problem-based learning, and field investigations. Participation in team activities can allow learners to develop collaboration skills.

Conclusion

The COVID-19 pandemic has brought about many changes in higher education. One of these changes is the expansion of online learning. In response to this change, this study investigated the development method of university education with the use of the rapidly growing online education programs and proposed a blended education method that combines online and offline education. The detailed contents of the proposed education method include the one-week education process and the education content of 15 weeks per semester. The education method proposed in this study is a general education process and content. Therefore, it is expected to be applied in accordance with different educational environments and conditions for each university.

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