

Case studies on the flipped classroom with a MOOC in college contexts

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대학에서의 MOOC기반 플립러닝 사례분석

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Abstract This study investigated the effects of applying the flipped classroom approach with MOOC to the college educational system. A total of six undergraduate students participated in the 10-week innovative learning setting. The participants performed online activities using the learning content from a MOOC website; this was followed by a participatory learning process in the offline classroom. The semi-structured face-to-face interviews for the six participants after the classes were completed and analyzed. The results showed that the instructional method enabled students to be highly motivated and to perform learning activities. However, there were some limitations: (1) learning was impeded due to English language issues and (2) the Korean education culture was still unfamiliar with this pedagogical method. Finally, suggestions for future research are discussed.

Key Words : MOOCs, Flipped classroom, Korean educational system, Learning activities, Online learning

요약 본 연구는 대학교육 시스템 내에서 MOOC을 활용한 플립 러닝 적용의 효과를 알아보기 위해 수행되었다. 이를 위해 총 여섯 명의 대학생들이 10주 동안의 새로운 학습 경험에 참여하였다. 참여자들은 먼저 MOOC 웹사이트에서 제공되는 학습 내용을 통해 온라인 활동을 수행하고, 오프라인 강의실에서 이와 연계된 참여적 학습을 수행하였다. 수업이 종료된 이후 연구참여자들을 대상으로 반구조화된 대면 인터뷰가 시행되었다. 연구결과 이 교수 방법은 학습자들이 높은 동기수준을 갖고 학습활동을 수행한 것으로 나타났다. 그러나 외국어로 제공되는 학습콘텐츠로 인한 학습계약, 새로운 학습방법에 대한 문화적 부적응의 문제들이 발견되었다. 본 연구를 바탕으로 향후 발전방안이 논의되었다.

주제어 : MOOCs, 플립 러닝, 한국 교육 시스템, 학습 활동, 온라인 학습

1. Introduction

Recently, massive open online courses (MOOCs) have received considerable global attention for their role in supplementing traditional higher education [1]. MOOCs provide students worldwide with opportunities to pursue higher

education by open courses over the Internet.

Through carefully selected online course contents, MOOCs can maintain the quality of the materials provided, which is a difficult task for lecturers who repeatedly teach the same courses in classrooms. MOOCs also serve as an organized system for learners can continually be imparted

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with high-quality learning materials. To maximize the effects of utilizing MOOCs as a learning tool, it is necessary to consider different environments, contexts, backgrounds, and cultures carefully.

While considerable research has been conducted on the appropriate instructional methods for adopting MOOCs in schools, the education community has also shown interest in the flipped classroom. The flipped classroom is an approach that entails a "flipping" of the traditional educational roles in the school and the home. In particular, learners can acquire knowledge at home by using online resources; this can reduce the time lecturers spend on delivering the learning content to students in the classroom. By being able to acquire target content at home, schools are capable of fostering students' deeper learning through various learning activities [2].

The flipped classroom approach is closely associated with the development of MOOCs as well as information technology (IT). Technological advances now equip learners with ubiquitous access to high-quality online learning material provided by MOOCs. These learners can then deepen their acquired knowledge in the classroom by interacting with teachers and students.

It is interesting to explore how MOOCs and the flipped classroom approach are adopted in the Korean educational system, which has a unique cultural and educational background: Korea has traditionally been a nation of advanced IT; it is equipped with super-speed information networks and a nationwide online infrastructure for Wi-Fi [3]. Based on the environments, most Korean K-12 students have experienced numerous online learning formats by using the IT facilities [4]. Meanwhile, the Korean education system has customarily placed emphasis on lecture-centered instruction with little interaction and collaboration in the classroom [5,6]. Due to this situation of Korea where the tendency to prefer traditional directive

learning environments overwhelms the advanced e-learning background utilization, it would be meaningful to examine the effect of the flipped classrooms and MOOCs which could change the old educational tradition.

Therefore, a flipped classroom learning design using a MOOC courseware was developed for this study. College student participants studied educational content using the MOOC and perform learning activities in offline classes to deepen the knowledge. Based on this case study's findings, the researchers investigated possible future directions for educational innovations.

2. Theoretical Backgrounds

MOOCs (Massive Open Online Courses) are systems that allow all learners with Internet to register and take open online courses. MOOCs have emerged as a supplement for higher education. They are considered an educational and social system that can democratize and popularize education [1,7]. Learners worldwide have the opportunity to receive valuable lessons from prestigious universities through the MOOCs websites. Even though challenges and criticisms such as low completion rates [8] and reiteration of the old form of the lecture [9], MOOCs are still an innovative and alternative form for the future education.

Similarly, the Korean government has provided online lectures since 2007 as open educational resources (OER) [10]. KOCW (Korea Open CourseWare) is a government-run website, which contained 32,396 online courses and 397,788 learning materials as of December 2017 [11]. In October 2015, the Korean government launched the KMOOC (Korea MOOC) as well. Compared to the KOCW, the KMOOC is quite similar to general MOOCs in terms of interactivity including Q&A's, discussions and quizzes, but is developed with Korean language [10]. With the

improvement of KMOOC, language issues are expected to disappear among Korean students. Even though research on MOOCs have generally concentrated on the acceptance and usage factors for taking MOOC classes, some studies have focused on learning effects from MOOC-based learning. For example, MOOCs for enhancing learning motivation and interaction [12], overall learning experiences [13], and collaborative learning for academic performances [14].

By the way, the flipped classroom is a learning approach that uses the Internet to deliver learning content online and moves homework into the classroom. In the flipped classroom methodology, the traditional role of home and class is “flipped:” Students are expected to familiarize themselves with class content in their own time through online, and teachers can organize in-class lecture time to complete hands-on activities in a collaborative way [15]. In a flipped classroom environment, traditional face-to-face lectures are replaced with pre-recorded videos, readings, and learning materials that students are expected to learn prior to coming to their lecture in-class. The physical and psychological precondition for adapting MOOCs in Korean classrooms is actually met in a way as Korean students have had rich experiences with e-learning. However, MOOCs for pedagogical purposes still need to be developed further as it is different from traditional Korean educational culture. Though the importance of MOOCs and flipped classroom is noted internationally [16, 17] and the high quality of MOOCs is known to be a useful resource for fostering learning in flipped classrooms, few research experiences exists that links MOOCs and flipped classroom together.

Based on these background and environments, this current research conducted a case study about the process and effects of applying flipped classrooms with MOOCs in Korean colleges, where students are still anxious toward English

learning and are familiar with instructor-driven classes. This study tried to reveal the innovative pedagogy’s educational implications for Korea’s unique context.

3. Methodology

3.1 Participants

Six undergraduate students from the class on Educational Technology Trends participated in this study. The University was in Seoul, Korea. Table 1 lists the participant demographics, including computer literacy levels and e-learning experiences. All students’ names are pseudonyms for privacy.

Table 1. Participant Demographics

ID	Age	Gender	Computer Literacy Level	Major	Minor
Andy	27	Male	Advanced	Educational Technology	English
Brad	26	Male	Advanced	Educational Technology	None
Cindy	22	Female	Advanced	Educational Technology	Communications
Debi	23	Female	Intermediate	Educational Technology	None
Emily	21	Female	Intermediate	Educational Technology	Business Administration
Fred	24	Male	Advanced	Educational Technology	Business Administration

Andy, a 27-year-old male student, was an English Literature minor. He was shy and reserved and was often not on congenial terms with his classmates. Brad was active, friendly, and enthusiastic about studying. On the other hand, Cindy was passive and quiet; she had lived in English- and Portuguese-speaking countries in her childhood. She minored in Communications and planned to participate in an exchange student program in Europe the following year. Debi was a studious girl who frequently asked

questions. She planned to go to graduate school. Emily was social and showed interest in outdoor activities. She confessed that she had not participated in any online activities during the research period after the third class. Fred was a quiet and diligent student. He frequently answered the instructor's questions definitively and correctly.

Since all the participants had experience with e-learning courses, they were comfortable in an online learning environment. In addition, they all had an average or advanced computer literacy, so there were no physical obstacles to performing and adapting to the flipped classroom approach with MOOCs. Moreover, all participants had high-speed Internet connection at home.

3.2 Pedagogical Methodology and Instructions

The research period spanned 10 weeks. During the first five weeks, the participants underwent orientation to help them understand the concept of flipped learning and the literature review. They were also instructed on how to participate in a flipped classroom setting using an actual MOOC. In the remaining five weeks, they experienced the flipped classroom with the designated MOOC materials, which were in line with the course's learning goals.

The MOOC used in this study was the "Instructional Ideas and Technology Tools for Online Success," which was taken from the website "coursesites.com." This five-week course was launched by a professor from a University in the U.S. The course was originally taught from May to June 2012 to users worldwide; at the time of the current study, this course remained accessible online. Students taking this course were required to watch lecture video recordings and to foster a deeper understanding of the course material by reading the assigned articles. In addition, the professor could interact with the

participants and discuss the learning materials in real time by using the "live event" function. The topic was "Instructional Ideas and Technology Tools for Online Success," and the weekly sub-topics were "Motivation and Online Retention"; "Addressing Diversity and Learning Styles"; "50 Hyper-Engaging Ideas: Critical, Creative, Cooperative"; "The Rise of Shared Online Video"; and "Wrap-up and Question & Answer Session."

Fig. 1. MOOC Learning Page

This flipped classroom approach with the MOOC was applied for five weeks. After the students learned the MOOC materials online, they participated in offline classes for three hours per week. These classes included the following specific stages insisted by Park and Lim (2014): (1) Confirmation stage: the students checked their own comprehension of the online content; (2) clarification stage: the instructor corrected students on concepts they misunderstood or got wrong; (3) collaboration stage: through collaborative activities, this stage aimed to share and enhance knowledge the students required from the MOOC by collaborative activities; (4) completion stage: finally, the students were expected to have collective intelligence from the online and offline learning activities [18]. Students could watch and learn online learning materials that were allotted each week at any time and place they wanted. The online classes were followed by offline ones

where students were supposed to conduct various activities to deepen knowledge and to achieve learning objectives. The activities included confirmation, clarification, collaboration, and completion stages as described. Students were expected to learn online content before the offline class.

3.3 Research Instrument

A qualitative case study was employed to analyze the study's process and results. In case studies, it is helpful to conduct interviews as they help researchers gain a deeper understanding of the participants' situations and results [19, 20]. Interviews also provide a basis for research participants to flesh out various ideas by comparing and analyzing them [21]. Accordingly, this study's authors selected some major topics that became the focus of the semi-structured face-to-face interviews for the six participants after the classes were completed. The interviewer was one of the authors and had taken a human-subjects training completion certificate.

Before starting the interviews, the interviewer clarified to the participants that if they expressed concern about the study or appeared physically/emotionally uncomfortable, all study-related activities would immediately stop. In addition, the interviewer tried to make the participants feel comfortable, which enabled them to freely express their views during the interview process. The participants were told that the collected data and information would be carefully stored under the researchers' protection, and they would only be used for educational research purposes. Pseudonyms were used to protect the participants' privacy. Each interview lasted 40 minutes. All the interviews were audio recorded after gaining the participants' consent; thereafter, transcriptions were made of all six participants' interviews. Finally, member checking was employed to enhance reliability [22].

4. Findings

The findings were organized according to the participants' answers regarding the pros and cons of online learning at home and offline learning in the class.

4.1 Experience with online learning

The participants highlighted some of the advantages associated with online learning at home.

Andy: I could take classes anywhere and anytime I wanted. Sometimes I would be tired of taking traditional offline classes, so it was better for me to take this new type of classes whenever I want to focus on my learning.

Debi: As the course was taught in English, it made me study both the subject and English at the same time by searching the meanings of words and sentences during classes. Also, flexible time management for taking online classes was another advantage of this learning approach.

Cindy: The high-quality content of online learning was systemically provided and I could learn more from this new kind of learning than from the common classroom.

Generally, the interviewees were interested in the new instructional method out of curiosity. In addition, some students utilized this opportunity to learn a foreign language in addition to the learning content. Moreover, another participant felt that the flipped classroom increased her intrinsic motivation.

Emily: As it's a new way to learn, I was interested in it and was strongly motivated to participate in the learning activities at the beginning.

Emily stated that the flipped classroom studying process was amazing, and she was more willing to invest time to study. However, her

interest rapidly decreased and she subsequently had the lowest participation rate, thus suggesting her interest was due to the novelty effect.

Participants also discussed the approach's disadvantages. Andy, who minored in English Literature, ironically stated that he had difficulty with the English learning content.

Andy: I am scared of English. Due to the English issue, I had to spend more energy to learn and it made me exhausted. For Korean classes, I could selectively listen between the more important parts and the less important ones. However, the English MOOC content made me listen attentively for the whole class. Also, I knew the online instructor worked hard to make the class interesting, but I could not feel it because of the different classroom culture and my English-related issue.

For Andy, the reason he decided to study English Literature as his minor was probably that he felt he should overcome his fear toward English. However, English content offered by a native speaker seemed to be too taxing for him. Another student also mentioned similar difficulties and challenges.

Fred: I had to spend a lot of time due to the pressure and fear of learning in English. On the contrary, it was an opportunity for me to realize the importance of English as an international language.

Moreover, Brad mentioned that he felt learned helplessness, which was created from his previous online learning experiences.

Brad: Actually, most of us are already familiar with taking online courses. Almost all high school students are experienced with taking Internet courses, and the format is similar to flipped classrooms in that students first take online

courses at home, and then study the same content again in the school. But, if it was effective for learning, all students who took the online courses would have done better on the test and obtained higher scores. Based on my own experience, Korean high school students spend many hours in schools and return home quite late; if they want to take online courses for pre-knowledge acquisition, they only have time to access to the online classes very late at night. They would already be very tired and cannot learn effectively... In this case, taking online course becomes more boring and tiring and it's hard to be motivated. And if the students repeatedly have this experience, they would feel helpless.

"Learned helplessness" refers to not trying to get out of a negative situation because their experiences have taught them that they are helpless [23]. Therefore, the student insisted that his learned helplessness prevented him from actively learning the MOOC content.

In addition, other participants mentioned the obstacles and difficulties in online learning, as no instructors checked or guided their learning process in the MOOC environment.

Debi: It was hard to sit and focus on the online content for more than one hour, as there was no supervisor... Also, some content could be overlooked as I could skip or jump through the online content when I thought I already knew the information.

Emily: There are many obstacles for paying attention to the learning content for long periods of time. For example, I watched the MOOC content while playing on my smartphone since there was no one to control me.

These two participants experienced losing control of themselves in a free environment, as they were used to being supervised during their learning process. As mentioned earlier, the

directive teaching style in Korea is a deeply rooted education culture [24, 5]. Therefore, the participants probably felt out of place when they were told to self-regulate their learning.

The disadvantage of a physical time gap between online course and offline classroom was also mentioned.

Cindy: As there was time gap between taking the online class and participating in the offline class, sometimes I forgot the learning content. That was not effective for me.

Since the participants received offline classes once a week for three hours, the students could forget what they had studied online in advance. The instructor did not urge the students to listen to the MOOC just before the offline classes, as when to listen to the MOOC was left up to the students.

4.2 Experience with offline learning

After completing the online MOOC courses, the students participated in the offline part of the study in the classroom setting. In the interviews, some participants pointed out that the main advantage of the offline class was to enable them to experience deeper understandings through the collaborative activities.

Andy: It was good for fostering deeper learning. You (the instructor) didn't need to cover all the learning contents but could instead focus on explaining the hardest or missing parts for the students. It was like completing a puzzle by interjecting the puzzle pieces in the missing spots... It also helped me memorize the learning content as your (the instructor's) summaries covered the learning content repeatedly.

Emily: It was useful for promoting deeper learning while traditional class had limitations for doing it.

One of the positive outcomes for this trial was to change the face of negative characteristics of traditional Korean education: Students felt they were allowed to ask questions and to initiate discussions freely, which was not common in the students' other courses.

Debi: Students could ask questions whenever they have questions and get the answers from the professor freely during this trial.

The instructor intentionally let students ask questions actively, which resulted in a free atmosphere that was not very common compared to previous classes. Meanwhile, the participants also highlighted some of the course's disadvantages. They mentioned that this new pedagogical method was novel and also extremely challenging from the beginning.

Andy: This method was too new and hard. Basically, it cannot be effective or efficient for learning if the students do not work hard. When it works well, it can maximize the learning effect; however, if it fails, its effects would be cut in half.

In the flipped classroom approach using the MOOC, the participants felt that they were under pressure to learn the same content twice (i.e., in the online and the offline classes).

Andy: In comparison to how I would traditionally complete an assignment after the class, I felt that more time and energy investments were needed to acquire the prior knowledge through online classes at home in the flipped classroom. I thought the flipped classroom was a way to make students study more at home and in school again, thus spending double the energy as if I was taking two classes at the same time.

Debi: This method asks the students to learn

the online content first and then study it again in offline class. As a result, students should work twice as hard as in the traditional classroom but would only receive a grade for one class. It means more pressure and effort for acquiring same grade.

Debi suggested the following: “It is necessary to reduce the overload of online activities for the students or to increase the grade points of the flipped classroom lessons.” This repetitive learning process studying the same or similar content twice; also lowered students’ motivation to learn.

Emily: It’s a kind of prior knowledge acquisition. After studying the MOOC, we had to study a slightly different but overall similar content again in school, and it made me feel less interested in learning. It was a repetition of the content that I already knew.

Brad: Though it was designed to lead students to freely interact and discuss together, but it failed. I think the Korean classroom culture that lacks free and interactive communication was the main reason for this failure. Students hesitated to speak about the things they know, and it obstructed the smooth process of a flipped classroom. Adapting flipped classrooms in Korean education is difficult.

Cindy: I like the method itself, but I felt sorry about the difficulties and problems that occurred due to several students’ unpreparedness from not taking the online course in advance.

The online and offline activities were designed differently so that they should not be identical. However, not a few students felt that the two activities were somewhat repetitive. The reasons included English-related issues, students’ insufficient preparation for the offline classes,

and low participation rate for the offline activities.

This inconsistency began from the confirmation stage, which was the first step of the offline classroom activity in the research: The participants showed considerable interest at the beginning of the class. However, even after five weeks of online study, the instructor had to spend a lot of time in the confirmation stage because the students had not fully acquired all the necessary knowledge from their online studies. The excessively large amount of material, which was also in English, and the added pressure of learning the content autonomously before the offline classes decreased the participants’ performance. Lower motivation meant that the participants did not study actively in the online classes. Therefore, although the confirmation stage in the study was originally designed to review and summarize the online learning content, it eventually became time used to teach content that should have already been acquired. A similar result was also found in another research (Park and Lim 2014) with Korean participants, where the students wanted the instructor to reiterate the online content instead of actively participating in the learning activities.

4.3 Overall evaluation by the participants

The participants emphasized that the flipped classroom with MOOC was quite a new and innovative pedagogical method. They also mentioned how it was different from the traditional lecture-centered method that focused mainly on cramming and memorization especially in Korean educational culture. However, the participants also felt that more factors needed to be considered if we were to extend and include this new instructional method to the existing educational setting.

Andy: When considering our culture, which gives much pressure on learning, I think the flipped classroom could become an alternative instructional strategy... Thus, I hope there is a way to maximize and optimize technology usage if this new method is meant to be generalized and used in schools. Providing computer graphics and various experiences is the unique merit that recent technology can offer to make it different from the traditional classes.

Debi: It was okay as there were only a few students in our class, but I think if there are too many students in a class, it will be hard to figure out who took the online courses or who did not, and it will cause difficulties in performing offline learning activities. Ways to support this is needed.

Brad: The educational method for each culture and environment should be prepared in order to implement the flipped classroom in a stable way. Also, teacher training should be conducted.

These comments highlighted a wide range of issues. First, most of the current MOOCs websites have similar interfaces (i.e., short video clips, links for further reading, etc.). If MOOCs should incorporate recent technology, user interfaces and user experiences need to be improved with more effective instructional methodologies. Second, it would be undesirable for instructors to check every time whether students took the online course before coming to school. However, instructors need to be aware of and be prepared for situations where some of the students did not take the online activities in advance. More fundamentally, instruction should be carefully designed for students so they can actively participate in both online and offline activities. The problems found in the current research include the difficulty with content in a foreign language and an education culture not familiar with participatory classes. The problems generated a vicious circle: When students did not

complete the online activities, the instructor inevitably explained the online content in class, and students felt they learned the same content twice (both online and offline) so they did not want to take the online courses in advance. Lastly, professional development programs should be updated to discuss and address these issues.

Additionally, the learner who grew up in Western culture answered the question about motivation decrease and loss of learning due to the language barrier.

Cindy: It would be more comfortable if the MOOCs classes were taught in Korean, but having class in English was not a critical aspect of my learning. I confidently recommend this method to other students.

Indeed, learning content in a foreign language could be a motivation to learn as well as a barrier. It is thus important to understand individual students' learning personality and to design instructional strategies adaptively.

Overall, more sophisticated methods need to be developed for future use.

Emily: There is a precondition for starting a flipped classroom with MOOCs where students should study the learning content to acquire knowledge. For allowing students to do this, a structured system should be prepared. When it is applied to elementary or middle schools, the schools should ask parents to help students go through the online learning content. Instructors should also have strategies to address students who successfully took the online course and those who did not.

Fred: Online activities can be considered a preview process that learners should complete. This could not only increase the pleasure but also the pressure in learning. Thus, findings ways

for students to participate in the class actively and pleasantly will affect the success or failure of flipped classrooms with MOOCs.

5. Conclusion

In this study, we investigated the application of the flipped classroom approach using a MOOC, a topic that has gained worldwide attention in the education community. We tried to apply the flipped classroom approach to the Korean educational system, which has a unique infrastructure and cultural background; we also searched for the implications this innovative method can have in our educational setting. Since only a limited number of college students participated in this research, the results cannot be generalized to include all students. However, several educational implications were found based on the case study results.

First, due to Korea's advanced IT infrastructure, the participants had no problems accessing the online learning material. However, the learning content in English posed an obstacle to some of the learners, which subsequently led to low motivation levels. Also, learners were familiar with the lecture-centered and directive approach so that the flipped classroom strategy with MOOCs (where active and voluntary activities were required) was uncomfortable for the participants.

Based on these findings, we would like to put forth several suggestions. First, it is important to design proper learning content before dissemination. Even though the quality of this study's MOOC content was verified, the Korean college students found it difficult to absorb the English content, and they thus spent more time than necessary trying to learn the information. This language barrier even led to delays in knowledge acquisition, which eventually lowered the participants' motivation to learn; a few

students even gave up on participating in learning activities. Therefore, when using MOOC content in a flipped classroom, it is necessary to use material that is most appropriate for learners by evaluating their backgrounds and individual characteristics. It is also necessary to consider presenting the same MOOC content in different ways, perhaps by setting different levels and multiple language options. Recently, some MOOCs have started using subtitles along with the content as a method to help students learn more effectively.

Second, the participants found it challenging to perform some of the learning activities because they were not familiar with this new learning culture. To help them successfully complete these activities, it is necessary for instructors to encourage students to participate. Learners have to be prepared to perform various learning activities that involve psychological and cognitive readiness. To improve their psychological readiness, instructors need to encourage learners to participate actively. To improve cognitive readiness, knowledge acquisition needs to be completed in advance by using MOOCs' online activities. In this study, the instructor helped students with incomplete knowledge acquisition by teaching the target concepts in the offline class. Accordingly, the instructor had to deliver the same content twice.

Third, in order to maximize the learning effects, it is necessary to develop context-based learning strategies and administrative supports when using the flipped classroom and MOOCs [25, 26]. Traditionally, lecture is recognized as one of the most popular teaching methods (especially in the Korean setting). Even though the flipped classroom with MOOCs might be a very innovative method, the learners' traits and learning styles should be carefully analyzed. Then adaptive learning strategies that meet each of the instructional environment can be utilized. Therefore, more research needs to be conducted

in order to reveal and validate effective efficient methods. The flipped classroom approach using MOOCs could be one method for effective learning; however, it is still necessary for researchers to use the available advanced technology to identify other methods that foster effective learning.

The findings of this study in which we applied the flipped classroom approach with MOOCs in the Korean educational system have educational implications applicable to different educational environments. It is necessary to conduct more case studies to address how this innovative educational method can be applied to a variety of educational context as well.

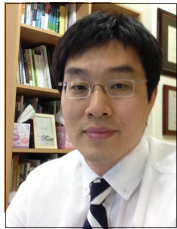
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