
The Effect of Flipped Learning on University Students' Learning Competency^a

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Abstract

The purpose of this study was to analyze the effect of flipped learning on improvement in learning competency of university students. In this study, two types of flipped learning were applied to two education-related classes at S University in Seoul, Korea. Two 75-minute classes were held each week and pre and post-tests which measure learning competency were conducted based on the achievement goals for each subject before and after the experiment. The results indicated that (1) both types of flipped learning were effective in improving the learning competency of university students, and (2) the method used in Experiment 1, where an on-line course was conducted, followed by the instructor intervening and conducting discussions, demonstrated verified improvements with a statistically significant difference ($p < .05$) between groups. In both the common and specific detailed competency in the area compared to the method in Experiment 2, where on-line material was studied and an instructor then played the role of an off-line facilitator.

Keywords: Flipped learning, learning competency, university classes, on-off line classes

^a This work was supported by the Soongsil University Research Fund (Convergence Research) of 2017

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Received: 7 Oct 2019, Revised: 8 Oct 2019, Accepted: 31 Oct 2019

<http://dx.doi.org/10.34226/gcl.2019.9.6.119>

Introduction

A rapidly changing society like today's needs a wide range of human competencies to search, select, memorize, and utilize the information it needs, rather than simply storing and memorizing it (Lee, Lim, & Kim, 2017). Therefore, instead of the traditional education methods that aimed at acquiring knowledge, new teaching methods—such as flipped learning—focused on improving the learner's ability to adapt to the flow of socioeconomic change, are getting attention. In particular, in the case of universities, there is a need for a change in the classroom environment that can strengthen students' ability to adapt to social change.

In university classes, despite students of broadly similar academic levels being assigned to the same department, there is always a difference in the degree of understanding and background knowledge of individual students, and there is also a difference in levels of motivation to participate in lectures. Undergraduate students who select a major according to their aptitude tend to participate in class actively with goal-oriented motivation, but for other students, learning goals are not always as clear. They may be confused about what they are studying and why, leading in turn to lower levels of motivation and a lack of achievement orientation. Additionally, the unilateral presentation of materials from a lecturer, knowledge transfer centered teaching methods, forcing students to make presentations on subject matter they don't fully understand, or unilaterally leaving classroom debates to students, will not help to improve student's motivation levels.

In order to foster future-oriented creative talents with confluent thinking ability in university, we need to give priority to developing and applying teaching methods that consider individual differences, the motivations of learners, and methods appropriate to the characteristics of the subjects. In future classrooms where such teaching methods can be applied, it will be necessary to induce the learning interest of students, cultivate an ability to learn rather than to have a fragmentary understanding, to break from excessive memorization-centered education, and to change the nature of education so that it fosters creative talents with the ability to impart and share their knowledge.

Flipping learning is one of the teaching-learning methods that focus on how to respond to these kinds of issues. Flipped learning can be defined as an educational technique that consists of two parts; interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom (Bishop & Bishop, 2013). The basic concept of flipped learning, also referred to as the "reversed classroom" and "reversed learning," is that "classroom and learning activities that have been done in the classroom in the past are done at home and homework that has been done at home is done during classroom lecture hours (Bergmann & Sams, 2012)." The purpose of flipped learning is to realize student-centered self-directed learning, by creating an environment in which learning is the center of the lesson itself, and the student becomes the true owner of the classroom and is responsible for their learning.

Recently, although the Korean Ministry of Education (2015) has encouraged flipped learning as a new teaching-learning method that can enhance learners' learning competency, it is still necessary to identify the effect of flipped learning objectively through specific experimental procedures applied to various class situations. Learning competency is an internal characteristic of individuals and a comprehensive concept that enables learners to learn and perform effectively. It is composed of knowledge, skills, self-concepts, traits, and motivational factors that can predict a learner's behavior. It further includes knowledge, skills, attitude, and motivation to learn based on the cognitive and defining characteristics of individuals (Lee, Kim, Ko, & Park, 2011).

In addition, Boyatzis (1982) suggests that learning competency can be divided into self-image, knowledge and skills, intrinsic characteristics such as motivation, self-image and social role, and skill, and enables us to understand the actions of individuals. Students need to develop their own learning skills in order to creatively orient themselves in the context of ever-changing uncertainty and crisis, and be prepared to strategically develop inner and outer behavioral areas in their own classes to achieve continuous adult learner competency. Based on this perspective, Lee et al. (2011) classified learning competency as being relevant to three domains: the cognitive, the motivational, and the learning behavior domains. There certainly exist various teaching-learning methods to develop the learning competency of university students, however, we believe that it is most important to improve social competency during class hours, which is essentially the main role of universities. Lee (2019), in analyzing previous research, and suggests that flipped learning is not a teaching method to memorize and learn knowledge, but it is a class method that helps to acquire various study methods and discussion skills appropriate to the situation and apply them to various places.

Therefore, it is necessary to devise a teaching-learning method accordingly, apply it to actual classrooms, and verify its effect. In order to develop an effective teaching and learning model applicable to major courses in universities, this study developed and applied two different classes based on flipped learning that were experimentally differentiated in classes that form part of the education major at 'S University' in Seoul, Korea. As university classes have their own specializations, even if they belong to the same department, the classes the researchers developed needed to be applied differently. Thus the researchers developed and applied two types of flipped learning classes, differentiated by subject, and attempted to confirm their effects. The purpose was to analyze the effect of flipped learning on university students' learning competency. The following research questions were formulated and verified through quasi-experimental research design:

(1) Is flipped learning effective in improving the learning competency of university students?

(2) Are there differences in learning competency improvement depending on the type of flipped learning?

Method

Participants

The participants of this study were 37 university students enrolled in courses in 'Adult Learning and Counseling' (14 students) and 'Multicultural Education' (23 students), major-oriented subjects of the Department of Lifelong Education at S University.

Instruments

Structure of the questionnaire

In this study, two kinds of class-related questionnaires were administered and the effect was verified by performing pre- and post-class tests. The questionnaire was composed of items measuring learning competency; these questions were sub-divided into those dealing with common competency (21 questions) and specific competency by subject (21 questions with two dimensions). The questionnaire's consistency and reliability (Cronbach α) are shown in Table 1 below.

Table 1. Construction of the questionnaire

Category	Characteristic	N (items)	Cronbach's α	
			Pre-test	Post-test
Common competency	Content is different according to the characteristics of each subject, but achievement goal competency is common or specific	21	.762	.683
	Knowledge (4)		.797	.709
	Motivation (4)		.654	.827
Specific competency	subject, but achievement goal competency is common or specific	Performance (4)	.751	.74
		Problem solving ability	.791	.663
		I, II, III / 3 questions for each situation (total 9)	.730	.826
			.739	.798
			.676	.799
Total			42	

Content of two differentiated flipped learning classes

The flipped learning format class was conducted with two experiment groups over 75 minutes of lectures twice a week. In Experiment Group 1 (Adult Learning and Counseling) students were instructed to study 'Adult Learning and Counseling', which was developed as an online course, before each lesson online through the university website. Following the precepts of flipped learning, small groups met in an off-line lecture and conducted a discussion, and the lecture was further elaborated on by the instructor. In summary, in

Experiment Group 1, the researchers proceeded with pre-lectures on-line, lecturing by instructors in the classroom, discussion, and then presentations.

In Experiment Group 2 (Multicultural Education), the students studied online contents provided by KOCW (<http://www.kocw.net>) related to multicultural education in advance of their class, and prepared a reflection paper based on them. They then conducted either a small or a large group discussion using methods such as games during the class. Additionally, they exchanged opinions at least six times individually on each of their reflection papers. Each class was led by the learners and the instructor took on the role of overall facilitation.

Comparing the groups, both Experiment Groups 1 and 2 were asked to participate in a video class on-line in advance, then present and take part in a discussion in their classroom lecture. The key difference between the two groups, however, was that the video lecture for Experiment Group 1 was based on the contents of the textbook and the course instructor also lectured the group, where as in Experiment Group 2, the video lecture was based on open on-line lecture material and the instructor's role was that of facilitator.

In this study, the researchers designed and experimented with two different classes with the aim of diversifying flipped learning lecture types. The experimental classes considered the specific characteristics of a class and the distinct needs of learners, by aiming to break out of the frame of watching videos pre-made by instructors and to have pre-discussion and debate format in the classroom.

Research Procedure

This study was conducted during the second semester of 2016 for students undertaking courses in "Adult Learning and Counseling" and "Multicultural Education", major subjects of the Lifelong Education department at "S" University located in Seoul, Korea. Before the experiment, the researchers performed a learning competency pre-test and the two subjects were differentiated in a flipped learning format for one semester. After the experiment, the researchers conducted a post-test and a learning ability test.

Results

The effect of flipped learning on learning competency improvement

In order to identify whether flipped learning is effective in improving the learning ability of university students, the researchers compared the pre- and post-test results of all students participating in the experiment through the paired sample t-test.

The aim was to see if flipped learning classes in 'Adult Learning and Counseling' and 'Multicultural Education' subjects improved learning competency. Average scores and

corresponding descriptive statistics for the paired sample in each area—presented in Table 2—show a slight improvement in the post-test compared to the pre-test.

Table 2. Flipped learning classes: Two paired sample t-test descriptive statistics

	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Skewness</i>	<i>Kurtosis</i>
CC2	37	2.911	.258	.432	-.107
CC1	37	2.683	.350	-.186	.467
SC2	37	3.034	.337	.574	.511
SC1	37	2.493	.445	.123	-.596
PSAO1	37	2.928	.417	-.197	.209
PSAR1	37	2.595	.583	-.143	-1.258
PSAO2	37	2.865	.434	.181	.629
PSAR2	37	2.451	.510	-.046	-.345
PSAO3	37	2.766	.560	-.833	.1397
PSAR3	37	2.460	.505	.777	.817

Note: CC2 = Common Competency Post-Test, CC1 = Common Competency Pre-Test, SC2 = Specific Competency Post-Test, SC1 = Specific Competency Pre-Test, PSAO 1 = Problem Solving Ability I Post-Test, PSAR 1 = Problem Solving Ability I Pre-Test, PSAO 2 = Problem Solving Ability II Post-Test, PSAR 2 = Problem Solving Ability II Pre-Test, PSAO 3 = Problem Solving Ability III Post-Test, PSAR 3 = Problem Solving Ability III Pre-Test

Table 3 shows the results of the t-tests on the two paired samples. There were statistically significant differences between the post-test and the pre-test scores in common competency (CC), specific competency (SC), and problem solving abilities I, II, and III ($p < .05$). This indicates that flipped learning has been effective in improving learning competency in these areas.

Table 3. Flipped learning classes: Two paired sample t-test

	<i>M</i>	<i>SD</i>	<i>t(df=36)</i>	<i>p</i>
CC2 - CC1	.228	.347	3.988	.000
SC2 - SC1	.541	.431	7.628	.000
PSAO1 - PSAR1	.333	.624	3.251	.000
PSAO2 - PSAR2	.414	.563	4.475	.002
PSAO3 - PSAR3	.306	.682	2.731	.010

Differences in learning competency for the two types of flipped learning group

The following is a comparison of the differences between the pre- and post-test scores comparing improvements in learning competency. Table 4 shows the t-test results of post- and pre mean differences in scores on questions concerned with academic achievement.

Table 4. Comparison of improvement of learning competency: Two independent samples t-test

	Group	N	M	SD	Levene's test		t(df=35)	p
					F	p		
CC	1	14	.405	.270	.305	.584	2.604	.013
	2	23	.120	.350	.305	.584	2.604(35)	.013
SC	1	14	.357	.373	.413	.525	-2.114	.042
	2	23	.652	.433	.413	.525	-2.114(35)	.042

Note: 1 = Adult Learning and Counseling, 2 = Multicultural Education, CC = Common Competency, SC = Specific Competency

Analysis results show that the method in Experiment 1, where an on-line course was conducted followed by the instructor intervening and conducting discussions, showed statistically significant differences ($p < .05$) in both the common and detailed competency types of learning competency, compared to the method in Experiment 2, where on-line material was studied and an instructor then played the role of an off-line facilitator. However, statistical differences were not significant in the area of problem solving ability ($p < .05$).

Discussion and conclusion

Smart education represents one possible response to continual changes to the educational environment in Korea and abroad, and this includes a change from the teacher-centered class to the learner-centered class. One example of this approach is flipped learning. Jacob and Matthew (2013) analyzed 24 studies related to flipped learning, and discussed the characteristics, advantages and disadvantages of this type of classroom. Lee (2019) also analyzed previous research. In this study, university students reported that providing text as a preliminary learning material prevented them from optimal achievement because they could not finish the material. Additionally, in all flipped learning classes, audiovisual materials were provided, and students reported that the shorter they were, the more positively they perceived them.

In the experiment groups 1 and 2 of this study, video was presented as a preliminary learning material, and results show that a flipped learning format providing video material or on-line lecture was helpful in terms of class effectiveness. However, as Experiment Group 1 showed more improvement in learning ability than Experiment Group 2, results also confirm that it is effective to include instructor lecture input as part of a course to help students fully understand course contents, even in flipped learning classes.

The following conclusions can be drawn from this study. First, the application of flipped learning in major subject courses in university is likely to be more effective when it considers the unique characteristics of a subject. Second, in order to improve the level of

satisfaction in the classroom, it is better for the students to participate more actively and lead any seminars, while instructors intervene where necessary.

To this end Kim, Kim, Khera, and Getman (2014) propose the following nine design principles: providing an opportunity for students to gain first exposure prior to class, an incentive for students to prepare for class, a mechanism to assess student understanding, clear connections between in-class and out-of-class activities, clearly defined and well-structured guidance, enough time for students to carry out the assignments, facilitation for building a learning community, prompt/adaptive feedback on individual or group works, and technologies familiar and easy to access.

The results of this study confirm that it is necessary to actively apply teaching methods utilizing smart teaching and a range of teaching-learning methods in order for lectures in university to operate as effectively as possible in the future. Further, it is necessary to collect a wide range of experimental data to facilitate efforts to improve university curricula. Up to this point, many studies have used a quantitative approach, and it is hoped that research on flipped learning through qualitative approach can be carried out in the future.

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Korean Abstract

플립러닝(flipped learning)이 대학생의 학습 역량에 미치는 영향

이경화 (송실대, 교수), 전주성 (송실대, 교수), 유경훈 (송실대, 교수)

이 연구의 목적은 플립러닝(거꾸로 학습)이 대학생의 학습 역량 향상에 미치는 효과를 확인하는 데 목적이 있었다. 따라서 실험연구를 위하여 서울 소재 S대학의 교육 관련 두 과목 수업에 두 가지 유형의 플립드 러닝을 적용하였다. 먼저 교육과 관련된 2개 반의 수업을 선정하여, 각각 두 가지 유형의 플립러닝을 적용하였는데, 매주 2번, 75분 동안 수업이 실시되었으며, 실험 전후에 각 과목의 성취 목표에 따라 학습 역량을 측정하는 사전, 사후 검사를 실시하였다. 연구결과는 첫째, 본 연구의 목표에 따라 설계된 두 가지 유형의 플립러닝은 모두 대학생의 학습 역량을 향상시키는 데 효과적이라는 것이 확인되었다. 둘째, 온라인 수업이 함께 진행되는 방식의 실험 1의 수업이 다른 방식의 수업보다 더 학생들의 학습 역량 향상에 효과가 있다는 것이 확인된 것이다($p < .05$). 즉, 온라인 수업과 중재 및 토론 수행이 함께 주어지는 것은 실험 2에서 적용한 것과 같이, 온라인 수업과 교수자가 오프라인에서 촉진자 역할을 수행하는 일반적인 플립러닝보다 더 효과적이라는 것을 의미한다.

주요어: 플립드 러닝, 학습역량, 대학수업, 온-오프라인 수업
